

POPULAR Computing WEEKLY

35p 16/23 December 1982 Vol 1 No 35

This Week

ZX81 QSave

Stephen Adams looks at QSave — a hard and software device that speeds up loading and saving on the ZX81. See page 13.

Vic20 skeleton

Asghar Ahmed provides a lesson in anatomy with this program for the Vic20 on page 27.

Singalonga Dragon

Keith and Steven Brain explain how to play Christmas carols on the Dragon 32. See page 29.

BBC Computer Programme

David Kelly talks to David Allen about the BBC's 2nd Computer Programme which will go on the air in January. See page 11.

★ STAR

Santa Claus on Spectrum and Dragon.

GAME★

News Desk



Members of the BMMG outside No 10 Downing Street.

Sinclair critical of BMMG stance

SINCLAIR Research has reacted critically to last week's proposals to protect the UK micro-computer industry from 'unfair' foreign competition put forward by the British Microcomputer Manufacturers' Group.

Instead the company — a member of the group — has proposed its own help formula.

The main BMMG proposal — a twelve-month embargo on US and Japanese micro-computer imports — is rejected by Sinclair. Clive Sinclair, in a written statement, said: "We do not believe that the BMMG package represents the most helpful way forward. Essentially it seeks to solve problems — caused by

Continued on page 5

Independent authority for cable tv

THE government has decided to set up an independent authority to govern the introduction of cable television in Britain.

The new authority, which will be completely separate from the Independent Broadcasting Authority, was announced by Information Technology Minister Kenneth Baker during a Commons debate on cable television. A White Paper detailing the authority's terms of reference will be released early next year.

Kenneth Baker also revealed the government's preference for a "switched star" system as opposed to "tree and branch". He conceded that this option would be more expensive, but said it had more potential for interactive communication.

The government also expressed a preference for fibre-optic cable as against the conventional copper co-axial cable.

Classified

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.
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Classified

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VIC20, cassette deck, ARFON expander, 16K RAM cartridge, super expander, joystick, £80 of software, £30 of books, mini condition, £375 one. Richard, Hurstpierpoint 833255.

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VIC20, Data set, books, 16K, super expander cartridges and cassettes, worth £550.00, selling for £300.00. Tel: 0978 822505.

SPECTRUM 16K. Hardly used, still in box with magazines plus two cassettes, £130.00 one. Tel: Basildon 553963 (David Edwards).

Classified

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Continued on page 32

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16K ZX81 £4.45 - Spectrum £4.95
Can also be used with AGF joystick.

Adventure 1: Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User, issue 2. Features Save game routine as the game can literally take months to complete.

16K ZX81 £8.95 - 48K Spectrum £9.95
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ZX81 16-48K THE FAST ONE is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

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ZX80 Pocket Book 128pp £4.95
Atom Business 110pp £7.50

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Machine Code

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be tempted.

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must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any
responsibility for any errors in programs we
publish, although we will always try our best to
make sure programs work.

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Editorial

Christmas is traditionally a time for
looking back over the past year and
reflecting on the various successes
and disappointments. However, rather
than bore you with a list of achieve-
ments and failures that is all too
familiar, I would prefer to concentrate
on some of the wider implications of
cheap, readily available, micro-
computers.

The micro revolution is undoubtedly
upon us, though it has arrived almost
unnoticed. Like the motor car, the
micro will change the way in which we
live forever. But, as with the motor car,
it is difficult to predict what will be
happening in two or three years time,
never mind twenty or thirty.

What does seem certain, however,
is that more people than ever before
will own or have access to a computer.
At this time last year some 200,000
people in Britain owned their own
micros. The comparable figure this
year is at least 600,000 and probably
much greater. By next year the figure
is likely to be in the millions.

Just as the industrial revolution
brought unparalleled opportunities, so
the micro revolution is opening up a
whole new world for our generation. It
is up to us to make the most of it.

A Merry Xmas to all our readers.

Next Thursday

Following our combined issue this
week, there will be no issue of *Popular
Computing Weekly* next week — but we
will be back with another action packed
edition on December 30.

Mike Grace will take another look at
some of the latest software for the
Vic20 while David Angler will present a
disassembler program for all 6502
based machines.

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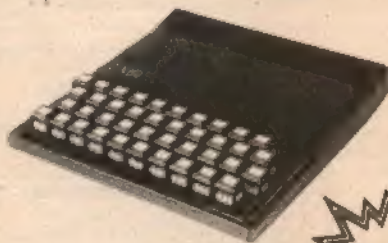
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Sinclair's way

Continued from page 1

regulations — with new regulations. It would be more in keeping with the spirit of the present government to dismantle existing controls which inhibit initiative and growth."

Three courses of action are proposed by Sinclair Research:

- Present government procurement policy should be overhauled to ensure equal opportunities for UK manufacturers.

- The present 17 percent duty on many imported electronic components should be substantially reduced. It compares unfavourably with the 6-8 percent duty on fully-assembled products imported, and discourages UK manufacture.

- Government should exert maximum diplomatic pressure to remove hidden UK export controls. According to the Sinclair statement many foreign governments regularly breach EEC or GATT international trade regulations.

Sinclair Research is understandably not keen to see any import restrictions applied to the UK because of possible reprisals by other countries. A substantial proportion of the company's computer production is exported. The ZX81 sells well in the competitive Japanese market and the new Timex 1000 is much sought-after in the US.

Spectrum goes on sale at WH Smith

THE Sinclair ZX Spectrum is now available over the counter at selected WH Smith stores. Previously, it was only available by mail order.

WH Smith, which already stocks the ZX81, began selling the Spectrum at 65 branches last week.

Stewart Binnie, WH Smith merchandise controller, said: "Demand exceeds supply at present, but we anticipate large deliveries as Christmas approaches. First deliveries of the 16K Spectrum begin this week to 65 branches which already have the 48K Spectrum."

"Initial quantities of Spectrum software are now available."



Sord takes the plunge

THE SORD M5 computer goes on sale in the UK in late February 1983.

It will sell both through major high-street stores and the dealer network that the company has been developing since opening its UK office a little over two months ago.

Priced at £169, the M5 machine is supplied with power pack, leads and three Rom

cartridges — Basic 1 and two games cartridges. Other games cartridges, FALC (a version of Sord's Pips for the M5) and joysticks will go on sale simultaneously but so far no prices have been agreed.

The Z80-based M5, with 8K Rom, 4K Ram and 16K video Ram, went on sale in Japan in October and America in November.

January computer show

LONDON Home Computer Show will be held at the Royal Horticultural Society Old Hall in Vincent Square, London from 7 to 9 January, 1983. The show will be open from 10 am to 6 pm on Friday and Saturday and from 11 am to 4 pm on Sunday.

The main emphasis of the show will be on microcomputers selling for less than £200 — although material for the Lynx and BBC machines will be included. Entry will cost around £1.50.

More details from Neil Johnson (01-437 1002).

Vics use Pet peripherals

INTERPOD is a new unit which allows Pet peripherals to be used by either the Vic20 or Commodore 64 machines.

The device attaches to the serial bus of the Vic20 or Commodore 64 and provides IEEE and RS232 interfaces. So these machines need not be restricted to using the 174K of the Vic 1540 single disc drive.

Use of a wide range of peripherals including the Pet 4040 (RAM), 8050 (1M) and 9090 (10M) disc units is possible. The Interpod has two IEEE ports so a printer or graph-plotter can also be used. The RS232 output has selectable baud rate (between 50 and 7,200 baud), parity and device numbering.

Mark Clark from Oxford Computer Systems who produce the unit explained: "The interpod just plugs straight in, and no alteration of the Vic software is necessary to operate it. As long as there is no device number clash, up to seven disc drives can be connected at the same time. In fact, up to 28 devices can be



driven simultaneously, using the Interpod unit."

Interpod is available from Oxford Computer Systems Ltd, The Old Signal Box, Hensington Road, Woodstock, Oxford, priced at £125 plus VAT.

Talk dispenser

COCO-COLA is to introduce video-game vending machines in the US.

The company plans to install new machines which give customers a free play of a video game with every purchase made. The dispensers give a choice of two games, played on built-in screens, which last for about 30 seconds.

The new selling strategy is a follow-up to the introduction last year of talking Coke dispensers.

Ace gets users group

A JUPITER Ace Users group has been formed by the Brighton-based software house, Remsoft.

Members paying the £7 subscription fee will receive three issues of a newsletter including hints, tips and special offers. John Noyce, co-founder of the group said: "The Ace is a lovely little machine, but it will need programs for its current unexpanded 3K form before users can fully benefit from its uniqueness."

As of January, production of the Jupiter Ace in Bury St Edmunds is being stepped up to 3000 units per month.

Commodore profits up

COMMODORE sales for the year to June 30, 1982, have risen to over £189m — 63 percent up on the previous year.

The company has also announced profits up to £25.2m. from last year's total of £15.5m.

Sales of microcomputer systems now account for 75 percent of the company's sales — the Pet range continues to sell well and the Vic20 has recently become the world's best selling microcomputer. Commodore UK is one of the company's largest divisions, accounting for 25 percent of world sales.

By far the biggest growth of micro sales was seen in the US, where an increase of some 190 percent was seen. Over 800,000 of the 1m Vic20 machines so far sold were bought in America. In the rest of the world microcomputer sales rose by a comparatively modest 34 percent.

In the UK the upward trend seems set to continue. British sales in the first quarter of 1982-3 showed a 120 percent increase over the same period in 1981-2.

Everything but a computer or the kitchen sink

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SHARK ATTACK

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MOONS OF JUPITER

For expanded Vic20, 3C, 88 or 10K

You are the Commander of a fleet of destroyers looking on from the safety of a mother ship, you send in one destroyer at a time to blast a passage through the MOONS OF JUPITER. Your destroyers have to dodge, and blast the UFOs . . . Watch out for the Galleys they can smash your destroyers, but you cannot harm them.

A Machine Code

Arcade Quality Game

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Machine Code

Arcade Quality Game

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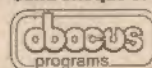


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□ Written by Kevin Flynn

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Some talk of a gift horse

I am writing to you, unfortunately, to complain. I have just had a personal computer bought for me by my parents. Unfortunately, due to the fact that it was for my birthday, they did not consult me about what make I wanted.

It is an Atari 400 and I am very pleased with it, but I have been trying to get some of your programs to run on it. I have not met with any success even when trying to convert it over to Atari 400 basic.

I have been collecting your magazine since No 2 and am extremely disappointed to see you do not print programs for my computer. It is a very popular computer and it has been featured in other magazines. Please could you print some games occasionally that will work on it and by this will attract a lot more readers.

Paul Harvey
16 Castle Road
Epsom
Surrey KT18 7NZ

We have been expanding our coverage recently to include a slightly wider range of micros. Our first review of Atari software was published in our December 9 issue.

We will be publishing a few Atari games in the New Year, depending on demand.

Goodwill and the agent

As service agents for W H Smith & Son Ltd, we feel a reply is needed in respect of the letter you published from Mr Alan Jones in your November 25 issue.

As long established service agents for various organisations, we have always operated on the basis that damage to a product cannot be covered by a guarantee; a fairly common principle. After all, guarantees are for protection against manufacturing defects, not subsequent damage.

The ZX81 keyboard can be damaged by pressing it with a hard object and in the past we have felt justified in charging for replacing these where damage was obvious. However, W H Smith & Son Ltd have asked that we now adopt a more lenient attitude towards their customers. As a result, such

repairs are now being carried out at no charge and are being returned with a pictorial explanation to avoid a recurrence.

Unfortunately, Mr Jones's repair took place before this instruction from W H Smith was given, although we still maintain there was nothing unfair about our actions.

He will be receiving a refund and as such will be benefiting from his suppliers' (W H Smith) desire to go beyond the requirements of the Sale of Goods Act to ensure their customers' goodwill.

In this particular instance, the keyboard was so badly damaged that this was noticed and recorded by our clerical staff before being passed to our engineers.

M H Wright
Interservice Electronics Ltd
87-91 Park Street
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From No byte to byte mode

In reply to K Robertson's letter in Vol 1 No 29, I can confirm that the listing, as published, works. It looks as if his program has gone from No byte mode to byte mode. Addresses 66 to 72 should have been:

66 or L	181 ASN
67 JRNZ,72	32
	37
69 INC (Y+64)	253 CLEAR
	52 4
	64 @
72 PUSH BC	197 OR
	If in Byte mode.

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Cambs

Confused by error messages

The Vic20 must surely be one of the most bug-free computers available. That said, and although the Vic20 file handling is excellent, it can become a little confusing when faced with error messages that are unknown even to Commodore. Try these short examples:

Enter VERIFY ""2. This gives "Illegal device number". How about For H = 3 to 255:Open H,H:Next giving "Too many files".

Run this: 10 Open 1,0:Input 1,K then type a string and Return. A "File data" error occurs instead of "Bad data" listed in the manuals. Enter VERIFY ""6. This gives "Missing file name". Also, when the Vic encounters an end of tape marker, it replies with "Device not present" error instead of "File not found".

Maybe these anomalies do not occur with all versions of the Vic, but they do with my early Japanese machine. Now let us see if anyone can find any more Vic20 error messages.

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Dragging it out by the roots

Thank you for starting the Dragon page. As the sometimes proud owner of a Dragon 32 and being a novice at programming/using micros, I was beginning to despair and slowly losing more hair!

I am now waiting with bated breath for the manual of that "well-known colour computer" (why couldn't you say Tandy?), in the hopes of becoming enlightened.

I have just finished reading a piece in an Australian magazine about the other machine and there are two points which will be of interest and perhaps use to other owners.

1. The maximum size of an array used with Get/Put commands is 1,400 elements.
2. If you want to increase the speed of this already fast beast, use Poke 65495,0. It really does work but be warned — do not use cassette statements and be prepared for Sound and Play commands to be rather strange, although still acceptable as sound effects.

The problem with the speed increase is that the only way I have found of turning it off is by manually resetting the machine! Peeking the location returns a value of 126 — always. I have tried Poking it with all sorts of numbers, but it always says it contains 126. This is a shame because, if resettable, it would provide a simple method of having two levels of speed in games.

I have tried using it on the Flying Saucers game (Popular Computing Weekly, November 4) and it makes it very difficult to win (I think my wife is going to see her solicitors). Perhaps someone could solve this for me and allow my hair to grow again!

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Fastening the donkey's head

In your magazine dated October 28, there was a program called "Donkey" for the ZX81. I would like to enter this program, but the first couple of lines have been missed out. So, please could you send me a copy of the complete program.

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You are quite correct. Somehow we inadvertently left out the first three lines of the program. The missing lines are:

1 LET S=0
10 POKE 16418,0
11 LET G=1000

A rather higher score

Re: Stewart Douglas — Popular Computing Weekly, November 4.

Sorry Stewart, but since I saw the Scramble program and typed it in, I have played it regularly. My highest score is just over 4,000 points with over 220 miles travelled. I regularly score over 2,500 points. I have also typed in a high score, a detailed account of score and a high score for travelling the greatest distance, all in 3.5K on my Vic20.

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If you have an opinion you want to express, or have spotted an error that needs correcting, write to: Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2.

Santa Claus

A new game for 16K Spectrum and Dragon 32 by David Lawrence

Many of the most intriguing games that can be played on a micro depend for their fascination on the effective simulation of a very natural phenomenon like the curve of the thrown ball. This simple Christmas game depends upon the simulation of presents thrown from a height into chimneys of varying elevation. In a flush of the Christmas spirit, the game is offered for both the 16K Spectrum and the Dragon 32.

It needs only a very cursory examination to see that the game is, in fact, very short in terms of the sections needed to actually play. But, in both versions these parts are almost doubled by the lines needed to provide the instructions and to set up the simple graphics initially. It is in relation to the graphics that the major differences arise between the two versions.

In the Spectrum game, the chimneys down which presents are to be tossed are each made up of four user defined characters, loaded into the memory by the module at line 3000. Since the user defined character facility is not available on the Dragon, and to Draw the 98 chimneys would be too slow, the five different chimney types (actually dice faces) are loaded into arrays using the *Get* command and simply printed to the screen using *Put*. This procedure is made more cumbersome by the fact that a separate array must be declared for each of the five types of chimneys.

Once the graphics are set up, the Spectrum is far more economical in the manner in which it can print the graphics to the screen in the module at line 3500. On the other hand, the Dragon's flexible *Draw* command allows small touches like the representation of the presents remaining by tiny 4x4 pixel squares.

Both versions of the game share some simple calculations, relating to direction of throw and speed (modules at 2000 and 2200) and the rate of descent compared with horizontal distance covered (2500).

In both versions the game is played on a screen completely devoid of text. The chimneys are displayed in the form of an 11x9 grid of dice faces. Each turn begins with a line being drawn around the grid, starting in the bottom left-hand corner. The line can be stopped at any point by pressing a key — this determines the direction of the throw from the centre of the screen.

This is followed by the generation of a horizontal line between two markers on either side of the screen. This line, too, is stopped by pressing any key — it represents the initial velocity of the throw. The meaning of the actual values represented will only become apparent as you play.

Having entered the direction and the velocity, the horizontal track of the throw will begin to be plotted on the grid. On the

right of the screen, a line descending from the top indicates the height of the present as it falls. Six marks at the bottom right of the screen indicate the floor and the relative heights of the five chimney types.

If the horizontal track is over a type five chimney when the height line hits the top marker, then the present has landed in that chimney. Chimneys can only be entered from the top, so that if the height marker is at less than the level of a type five chimney when the horizontal track tries to enter a type five square, the present crashes and is lost.

Each time a present enters a chimney which has not been entered before, two things happen. Firstly, the player's score is incremented by six minus the type of the chimney — that is to say the lowest chimneys score highest. Secondly, on each subsequent turn the representation of that chimney will be inverted and will not score if it is entered on subsequent turns.

One final complication is that the height from which the presents are thrown decreases with every second turn. This makes it increasingly difficult to hit low chimneys on the outside of the grid which are masked by higher chimneys. Such inaccessible chimneys need to be attempted early on, as you have only 40 presents per game.

The object of the game is to get as many points as possible with the 40 presents, it's as simple — and as difficult — as that.

Commentary

The lines of both versions are untidily numbered, since to renumber either or both would disturb the correspondence between the line numbers of the two versions.

Lines

- 1000 The module beginning at this line simply distributes tasks among the other sections of the program during play and displays the score at the end.
- 1200 This module sets up the array of chimneys. Note that in the Dragon version you cannot enter this module by means of a *Gosub*, since the *Return* destination is lost when the memory is cleared.
- 2000 The purpose of this module is simply to draw the direction indicator line around the array of chimneys.
- 2200 The angle of the direction in relation to the centre of the grid is calculated. Lines 2250 and 2260 simply determine the relative proportions of the increments to horizontal and vertical co-ordinates every time a point is plotted on the trajectory. Whichever is the greater is made equal to 1 so that when the trajectory comes to be printed by a loop, every repetition of the loop plots (or *Plots*) a fresh point.
- 2310 The loop commencing here draws the line indicating the velocity of the throw.
- 2500 In this module the trajectory of the present is plotted. Various tests are performed to ensure that the trajectory has not passed off the screen and that the present has not landed. The variables *X1* and *Y1*, calculated by the module at line 4000, indicate the array element in *A* which is represented by the current screen position. *X2*



and Y2 simply record the array element in which the last point fell in. If a landing is made and X2,Y2 are not equal to X1,Y1 then the present has actually crashed into the wall of a chimney. The formula at 2580 simulates the effect of gravity on the present. If a valid landing is made the value of the array element is multiplied by -1.

3000 (Dragon) In this module three things happen. Firstly, five arrays are dimensioned to hold the five dice faces. This is clumsy but unfortunately a three-dimensional array of the form B(5,16,16) is not permitted. Secondly, strings are defined which will draw the square surrounding the dice

face and the dots. Thirdly, the five combinations are drawn on to a graphics page (they are not seen on the screen since we have not called up the graphics screen yet) and put into the five arrays using GEF. Note the use of the qualifier 'G' in the use of the GEF command — this is because the resulting pictures stored in the arrays will be sometimes printed in inverse form and tend to produce unexpected results if the optional 'G' is not used.

3000 (Spectrum) A fairly standard module for loading user defined characters into the memory. Each group of four data lines defines a single dice face.

3500 (Dragon) In this module the graphics screen is cleared of the dice faces which were placed on to it in the last module and called up. Dice faces corresponding to the value in each element of the array A are put on to the screen at 16-pixel intervals horizontally and vertically.

3500 (Spectrum) A much simpler module since it is possible to manipulate the character to be printed by reference to the value contained in the relevant element of the array A without recourse to On...Gosub.

4000 This module simply calculates the array element corresponding to the current position of the present on the screen.

Santa on Spectrum

```
1000 REM *****
1010 REM  MAIN PROGRAM
1020 REM *****
1030 CLS : PRINT "PAPER 2: INK"
1040 CLS : PRINT "SANTA'S POSTAL SERVICE"
1050 REM *****
1060 PRINT "DO YOU WANT INSTRUCTIONS (Y/N)?" : INPUT G$: IF G$="Y" THEN GO SUB 4000
1070 CLS : GO SUB 1200
1080 CLS : GO SUB 3000
1090 FOR M=300 TO 100 STEP -10:
1100   GO TO 2
1110 IF INKEY$="" THEN GO TO 114
1120 CLS : NEXT M
1130 CLS : PRINT "PAPER 2: INK"
1140 CLS : PRINT "SANTA'S POSTAL SERVICE"
1150 REM *****
1160 PRINT "YOUR SCORE WAS " : B
1170 CLS : STOP
1180 REM *****
1190 REM  INITIALISE
1200 REM *****
1210 DIM A(16,16) : DIM B(5,16,16)
1220 DIM C(16,16) : DIM D(16,16)
1230 FOR J=1 TO 16: FOR I=1 TO 16:
1240   LET A(I,J)=INT(RND(6))+1
1250   LET B(I,J)=0
1260   LET C(I,J)=0
1270   LET D(I,J)=0
1280   LET E(I,J)=0
1290   LET F(I,J)=0
1300   LET G(I,J)=0
1310   LET H(I,J)=0
1320   LET I(I,J)=0
1330   LET J(I,J)=0
1340   LET K(I,J)=0
1350   LET L(I,J)=0
1360   LET M(I,J)=0
1370   LET N(I,J)=0
1380   LET O(I,J)=0
1390   LET P(I,J)=0
1400   LET Q(I,J)=0
1410   LET R(I,J)=0
1420   LET S(I,J)=0
1430   LET T(I,J)=0
1440   LET U(I,J)=0
1450   LET V(I,J)=0
1460   LET W(I,J)=0
1470   LET X(I,J)=0
1480   LET Y(I,J)=0
1490   LET Z(I,J)=0
1500   LET AA(I,J)=0
1510   LET AB(I,J)=0
1520   LET AC(I,J)=0
1530   LET AD(I,J)=0
1540   LET AE(I,J)=0
1550   LET AF(I,J)=0
1560   LET AG(I,J)=0
1570   LET AH(I,J)=0
1580   LET AI(I,J)=0
1590   LET AJ(I,J)=0
1600   LET AK(I,J)=0
1610   LET AL(I,J)=0
1620   LET AM(I,J)=0
1630   LET AN(I,J)=0
1640   LET AO(I,J)=0
1650   LET AP(I,J)=0
1660   LET AQ(I,J)=0
1670   LET AR(I,J)=0
1680   LET AS(I,J)=0
1690   LET AT(I,J)=0
1700   LET AU(I,J)=0
1710   LET AV(I,J)=0
1720   LET AW(I,J)=0
1730   LET AX(I,J)=0
1740   LET AY(I,J)=0
1750   LET AZ(I,J)=0
1760   LET BA(I,J)=0
1770   LET BB(I,J)=0
1780   LET BC(I,J)=0
1790   LET BD(I,J)=0
1800   LET BE(I,J)=0
1810   LET BF(I,J)=0
1820   LET BG(I,J)=0
1830   LET BH(I,J)=0
1840   LET BI(I,J)=0
1850   LET BJ(I,J)=0
1860   LET BK(I,J)=0
1870   LET BL(I,J)=0
1880   LET BM(I,J)=0
1890   LET BN(I,J)=0
1900   LET BO(I,J)=0
1910   LET BP(I,J)=0
1920   LET BQ(I,J)=0
1930   LET BR(I,J)=0
1940   LET BS(I,J)=0
1950   LET BT(I,J)=0
1960   LET BU(I,J)=0
1970   LET BV(I,J)=0
1980   LET BW(I,J)=0
1990   LET BX(I,J)=0
2000   LET BY(I,J)=0
2010   LET BZ(I,J)=0
2020   LET CA(I,J)=0
2030   LET CB(I,J)=0
2040   LET CC(I,J)=0
2050   LET CD(I,J)=0
2060   LET CE(I,J)=0
2070   LET CF(I,J)=0
2080   LET CG(I,J)=0
2090   LET CH(I,J)=0
2100   LET CI(I,J)=0
2110   LET CJ(I,J)=0
2120   LET CK(I,J)=0
2130   LET CL(I,J)=0
2140   LET CM(I,J)=0
2150   LET CN(I,J)=0
2160   LET CO(I,J)=0
2170   LET CP(I,J)=0
2180   LET CQ(I,J)=0
2190   LET CR(I,J)=0
2200   LET CS(I,J)=0
2210   LET CT(I,J)=0
2220   LET CU(I,J)=0
2230   LET CV(I,J)=0
2240   LET CW(I,J)=0
2250   LET CX(I,J)=0
2260   LET CY(I,J)=0
2270   LET CZ(I,J)=0
2280   LET DA(I,J)=0
2290   LET DB(I,J)=0
2300   LET DC(I,J)=0
2310   LET DD(I,J)=0
2320   LET DE(I,J)=0
2330   LET DF(I,J)=0
2340   LET DG(I,J)=0
2350   LET DH(I,J)=0
2360   LET DI(I,J)=0
2370   LET DJ(I,J)=0
2380   LET DK(I,J)=0
2390   LET DL(I,J)=0
2400   LET DM(I,J)=0
2410   LET DN(I,J)=0
2420   LET DO(I,J)=0
2430   LET DP(I,J)=0
2440   LET DQ(I,J)=0
2450   LET DR(I,J)=0
2460   LET DS(I,J)=0
2470   LET DT(I,J)=0
2480   LET DU(I,J)=0
2490   LET DV(I,J)=0
2500   LET DW(I,J)=0
2510   LET DX(I,J)=0
2520   LET DY(I,J)=0
2530   LET DZ(I,J)=0
2540   LET EA(I,J)=0
2550   LET EB(I,J)=0
2560   LET EC(I,J)=0
2570   LET ED(I,J)=0
2580   LET EE(I,J)=0
2590   LET EF(I,J)=0
2600   LET EG(I,J)=0
2610   LET EH(I,J)=0
2620   LET EI(I,J)=0
2630   LET EJ(I,J)=0
2640   LET EK(I,J)=0
2650   LET EL(I,J)=0
2660   LET EM(I,J)=0
2670   LET EN(I,J)=0
2680   LET EO(I,J)=0
2690   LET EP(I,J)=0
2700   LET EQ(I,J)=0
2710   LET ER(I,J)=0
2720   LET ES(I,J)=0
2730   LET ET(I,J)=0
2740   LET EU(I,J)=0
2750   LET EV(I,J)=0
2760   LET EW(I,J)=0
2770   LET EX(I,J)=0
2780   LET EY(I,J)=0
2790   LET EZ(I,J)=0
2800   LET FA(I,J)=0
2810   LET FB(I,J)=0
2820   LET FC(I,J)=0
2830   LET FD(I,J)=0
2840   LET FE(I,J)=0
2850   LET FF(I,J)=0
2860   LET FG(I,J)=0
2870   LET FH(I,J)=0
2880   LET FI(I,J)=0
2890   LET FJ(I,J)=0
2900   LET FK(I,J)=0
2910   LET FL(I,J)=0
2920   LET FM(I,J)=0
2930   LET FN(I,J)=0
2940   LET FO(I,J)=0
2950   LET FP(I,J)=0
2960   LET FQ(I,J)=0
2970   LET FR(I,J)=0
2980   LET FS(I,J)=0
2990   LET FT(I,J)=0
3000   LET FU(I,J)=0
3010   LET FV(I,J)=0
3020   LET FW(I,J)=0
3030   LET FX(I,J)=0
3040   LET FY(I,J)=0
3050   LET FZ(I,J)=0
3060   LET GA(I,J)=0
3070   LET GB(I,J)=0
3080   LET GC(I,J)=0
3090   LET GD(I,J)=0
3100   LET GE(I,J)=0
3110   LET GF(I,J)=0
3120   LET GG(I,J)=0
3130   LET GH(I,J)=0
3140   LET GI(I,J)=0
3150   LET GJ(I,J)=0
3160   LET GK(I,J)=0
3170   LET GL(I,J)=0
3180   LET GM(I,J)=0
3190   LET GN(I,J)=0
3200   LET GO(I,J)=0
3210   LET GP(I,J)=0
3220   LET GQ(I,J)=0
3230   LET GR(I,J)=0
3240   LET GS(I,J)=0
3250   LET GT(I,J)=0
3260   LET GU(I,J)=0
3270   LET GV(I,J)=0
3280   LET GW(I,J)=0
3290   LET GX(I,J)=0
3300   LET GY(I,J)=0
3310   LET GZ(I,J)=0
3320   LET HA(I,J)=0
3330   LET HB(I,J)=0
3340   LET HC(I,J)=0
3350   LET HD(I,J)=0
3360   LET HE(I,J)=0
3370   LET HF(I,J)=0
3380   LET HG(I,J)=0
3390   LET HH(I,J)=0
3400   LET HI(I,J)=0
3410   LET HJ(I,J)=0
3420   LET HK(I,J)=0
3430   LET HL(I,J)=0
3440   LET HM(I,J)=0
3450   LET HN(I,J)=0
3460   LET HO(I,J)=0
3470   LET HP(I,J)=0
3480   LET HQ(I,J)=0
3490   LET HR(I,J)=0
3500   LET HS(I,J)=0
3510   LET HT(I,J)=0
3520   LET HU(I,J)=0
3530   LET HV(I,J)=0
3540   LET HW(I,J)=0
3550   LET HX(I,J)=0
3560   LET HY(I,J)=0
3570   LET HZ(I,J)=0
3580   LET IA(I,J)=0
3590   LET IB(I,J)=0
3600   LET IC(I,J)=0
3610   LET ID(I,J)=0
3620   LET IE(I,J)=0
3630   LET IF(I,J)=0
3640   LET IG(I,J)=0
3650   LET IH(I,J)=0
3660   LET II(I,J)=0
3670   LET IJ(I,J)=0
3680   LET IK(I,J)=0
3690   LET IL(I,J)=0
3700   LET IM(I,J)=0
3710   LET IN(I,J)=0
3720   LET IO(I,J)=0
3730   LET IP(I,J)=0
3740   LET IQ(I,J)=0
3750   LET IR(I,J)=0
3760   LET IS(I,J)=0
3770   LET IT(I,J)=0
3780   LET IU(I,J)=0
3790   LET IV(I,J)=0
3800   LET IW(I,J)=0
3810   LET IX(I,J)=0
3820   LET IY(I,J)=0
3830   LET IZ(I,J)=0
3840   LET JA(I,J)=0
3850   LET JB(I,J)=0
3860   LET JC(I,J)=0
3870   LET JD(I,J)=0
3880   LET JE(I,J)=0
3890   LET JF(I,J)=0
3900   LET JG(I,J)=0
3910   LET JH(I,J)=0
3920   LET JI(I,J)=0
3930   LET JJ(I,J)=0
3940   LET JK(I,J)=0
3950   LET JL(I,J)=0
3960   LET JM(I,J)=0
3970   LET JN(I,J)=0
3980   LET JO(I,J)=0
3990   LET JP(I,J)=0
4000   LET JQ(I,J)=0
4010   LET JR(I,J)=0
4020   LET JS(I,J)=0
4030   LET JT(I,J)=0
4040   LET JU(I,J)=0
4050   LET JV(I,J)=0
4060   LET JW(I,J)=0
4070   LET JX(I,J)=0
4080   LET JY(I,J)=0
4090   LET JZ(I,J)=0
4100   LET KA(I,J)=0
4110   LET KB(I,J)=0
4120   LET KC(I,J)=0
4130   LET KD(I,J)=0
4140   LET KE(I,J)=0
4150   LET KF(I,J)=0
4160   LET KG(I,J)=0
4170   LET KH(I,J)=0
4180   LET KI(I,J)=0
4190   LET KJ(I,J)=0
4200   LET KK(I,J)=0
4210   LET KL(I,J)=0
4220   LET KM(I,J)=0
4230   LET KN(I,J)=0
4240   LET KO(I,J)=0
4250   LET KP(I,J)=0
4260   LET KQ(I,J)=0
4270   LET KR(I,J)=0
4280   LET KS(I,J)=0
4290   LET KT(I,J)=0
4300   LET KU(I,J)=0
4310   LET KV(I,J)=0
4320   LET KW(I,J)=0
4330   LET KX(I,J)=0
4340   LET KY(I,J)=0
4350   LET KZ(I,J)=0
4360   LET LA(I,J)=0
4370   LET LB(I,J)=0
4380   LET LC(I,J)=0
4390   LET LD(I,J)=0
4400   LET LE(I,J)=0
4410   LET LF(I,J)=0
4420   LET LG(I,J)=0
4430   LET LH(I,J)=0
4440   LET LI(I,J)=0
4450   LET LJ(I,J)=0
4460   LET LK(I,J)=0
4470   LET LL(I,J)=0
4480   LET LM(I,J)=0
4490   LET LN(I,J)=0
4500   LET LO(I,J)=0
4510   LET LP(I,J)=0
4520   LET LQ(I,J)=0
4530   LET LR(I,J)=0
4540   LET LS(I,J)=0
4550   LET LT(I,J)=0
4560   LET LU(I,J)=0
4570   LET LV(I,J)=0
4580   LET LW(I,J)=0
4590   LET LX(I,J)=0
4600   LET LY(I,J)=0
4610   LET LZ(I,J)=0
4620   LET MA(I,J)=0
4630   LET MB(I,J)=0
4640   LET MC(I,J)=0
4650   LET MD(I,J)=0
4660   LET ME(I,J)=0
4670   LET MF(I,J)=0
4680   LET MG(I,J)=0
4690   LET MH(I,J)=0
4700   LET MI(I,J)=0
4710   LET MJ(I,J)=0
4720   LET MK(I,J)=0
4730   LET ML(I,J)=0
4740   LET MM(I,J)=0
4750   LET MN(I,J)=0
4760   LET MO(I,J)=0
4770   LET MP(I,J)=0
4780   LET MQ(I,J)=0
4790   LET MR(I,J)=0
4800   LET MS(I,J)=0
4810   LET MT(I,J)=0
4820   LET MU(I,J)=0
4830   LET MV(I,J)=0
4840   LET MW(I,J)=0
4850   LET MX(I,J)=0
4860   LET MY(I,J)=0
4870   LET MZ(I,J)=0
4880   LET NA(I,J)=0
4890   LET NB(I,J)=0
4900   LET NC(I,J)=0
4910   LET ND(I,J)=0
4920   LET NE(I,J)=0
4930   LET NF(I,J)=0
4940   LET NG(I,J)=0
4950   LET NH(I,J)=0
4960   LET NI(I,J)=0
4970   LET NJ(I,J)=0
4980   LET NK(I,J)=0
4990   LET NL(I,J)=0
5000   LET NO(I,J)=0
5010   LET NP(I,J)=0
5020   LET NQ(I,J)=0
5030   LET NR(I,J)=0
5040   LET NS(I,J)=0
5050   LET NT(I,J)=0
5060   LET NU(I,J)=0
5070   LET NV(I,J)=0
5080   LET NW(I,J)=0
5090   LET NX(I,J)=0
5100   LET NY(I,J)=0
5110   LET NZ(I,J)=0
5120   LET OA(I,J)=0
5130   LET OB(I,J)=0
5140   LET OC(I,J)=0
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5170   LET OF(I,J)=0
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5870   LET QX(I,J)=0
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6260   LET SK(I,J)=0
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6340   LET SS(I,J)=0
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6620   LET TU(I,J)=0
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6640   LET TW(I,J)=0
6650   LET TX(I,J)=0
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6730   LET UF(I,J)=0
6740   LET UG(I,J)=0
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6790   LET UL(I,J)=0
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6810   LET UN(I,J)=0
6820   LET UO(I,J)=0
6830   LET UP(I,J)=0
6840   LET UQ(I,J)=0
6850   LET UR(I,J)=0
6860   LET US(I,J)=0
6870   LET UT(I,J)=0
6880   LET UV(I,J)=0
6890   LET UW(I,J)=0
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6910   LET UY(I,J)=0
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7480   LET XD(I,J)=0
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8760   LET CB(I,J)=0
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8850   LET CK(I,J)=0
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9650   LET FM(I,J)=0
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9960   LET GR(I,J)=0
9970   LET GS(I,J)=0
9980   LET GT(I,J)=0
9990   LET GU(I,J)=0
10000   LET GV(I,J)=0
10010   LET GW(I,J)=0
10020   LET GX(I,J)=0
10030   LET GY(I,J)=0
10040   LET GZ(I,J)=0
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10220   LET HR(I,J)=0
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10300   LET HZ(I,J)=0
10310   LET IA(I,J)=0
10320   LET IB(I,J)=0
10330   LET IC(I,J)=0
10340   LET ID(I,J)=0
10350   LET IE(I,J)=0
10360   LET IF(I,J)=0
10370   LET IG(I,J)=0
10380   LET IH(I,J)=0
10390   LET II(I,J)=0
10400   LET IJ(I,J)=0
10410   LET IK(I,J)=0
10420   LET IL(I,J)=0
10430   LET IM(I,J)=0
10440   LET IN(I,J)=0
10450   LET IO(I,J)=0
10460   LET IP(I,J)=0
10470   LET IQ(I,J)=0
10480   LET IR(I,J)=
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1320 NEXT J,I
1330 LET X2=6:LET Y2=5
1340 LET SCORE=0:LET AK4.5)=0
1350 GOTO 1095
1400 GOTO 1095
2000 REM*****
2010 REM DIRECTION
2020 REM*****
2030 LET S1=119:LET S2=96
2040 LET X=16:FOR Y=175 TO 17 STEP -1
2070 PSET (X,Y)
2080 IF INKEY<>"" THEN GOTO 2200
2095 NEXT Y
2090 FOR X=16 TO 222
2100 PSET (X,Y)
2110 IF INKEY<>"" THEN GOTO 2200
2120 NEXT X
2130 FOR Y=16 TO 174
2140 PSET (X,Y)
2150 IF INKEY<>"" THEN GOTO 2200
2160 NEXT Y
2170 FOR X=223 TO 16 STEP -1
2180 PSET (X,Y)
2190 IF INKEY<>"" THEN GOTO 2200
2195 NEXT X
2200 REM*****
2210 REM ANGLE AND VELOCITY
2220 REM*****
2230 FOR I=1 TO 500:NEXT I
2240 H1=X-81:V1=Y-52
2250 IF ABS (V1)>ABS(H1) THEN LET V2=SGN
(V1):LET H2=ABS(H1/V1)*SGN(H1)
2260 IF ABS(H1)>ABS(V1) THEN LET H2=SGN
(H1):LET V2=ABS(V1/H1)*SGN(V1)
2310 FOR V=0 TO 240
2320 PSET (V,3):IF INKEY<>"" THEN GOTO
2300
2330 NEXT V
2350 RETURN
2360 REM*****
2370 REM PLOT COURSE
2380 REM*****
2390 LET T=(255-V)/1000
2400 FOR I=1 TO 100
2410 LET X=INT(S1+INT(I*H2)):LET Y=INT
(S2+INT(I*V2))
2450 IF Y<0 OR Y>191 THEN RETURN
2460 IF PPOINT(X,Y)<0 THEN PRESET(X,Y)
ELSE PSET(X,Y)
2470 GOSUB 4000
2480 LET H3=H-S*(T/I)^2:IF H3<0 THEN
RETURN
2490 IF X1=X2 AND Y1=Y2 AND X1<999 AND
Y1<999 THEN IF H3<ABS(RY1,X1)*20 AND
RY1,X1)>0 THEN LET SCORE=SCORE+6*RY1,
X1):LET RY1,X1)=RY1,X1)*2-1
2510 IF X1<999 AND Y1<999 THEN IF
H3<ABS(RY1,X1)*20 THEN RETURN

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2515 LET Y2=Y1:LET X2=X1
2520 IF H3/2<191 THEN LINE(252,0)-(252,
191)-(H3/2),PSET
2700 NEXT I:RETURN
3000 REM*****
3010 REM CHIMNEY SQUARES
3020 REM*****
3030 PCLS PHODE4
3032 DIM B1(16,16):DIM B2(16,16):DIM B3
(16,16):DIM B4(16,16):DIM B5(16,16)
3036 DIM B(3):LET B(1)=B1:R15:D15:L15:
U15)
3040 LET B(1)=B(1)+BR7:BD7:R1:D1:L1
3050 LET B(2)=B(2)+BR3:BD3:R1:D1:L1:BD7:
BR9:R1:D1:L1
3060 LET B(3)=B(3)+BR11:BD3:R1:D1:L1:BD7:
BL9:R1:D1:L1
3070 DRAW B(1):GET (1,1)-(16,16),B1,G
3080 DRAW B(2):GET (1,1)-(16,16),B3,G
3090 DRAW B(3):GET (1,1)-(16,16),B5,G
3100 PCLS:DRAW B(2):GET (1,1)-(16,16),B2,G
3110 DRAW B(3):GET (1,1)-(16,16),B4,G
3200 RETURN
3300 REM*****
3310 REM PRINT CHIMNEYS
3320 REM*****
3325 PHODE4 PCLS SCREEN 1,1
3330 FOR I=24 TO 152 STEP 16:FOR J=32 TO
152 STEP 16
3335 IF I=80 AND J=80 THEN GOTO 3370
3337 LET I1=(I-24)/16:LET J1=(J-32)/16
3340 ON ABS(A(I1,J1)) GOSUB 3710,3720,
3730,3740,3750
3350 IF A(I1,J1)<0 THEN PUT(J1,I1)-(J1+15,
I1+15),B1,NOT
3370 NEXT J,I
3600 DRAW "BM250,191":FOR I=1 TO 6:DRAW
"R5:U1:L5:BM+0,-10":NEXT I
3610 DRAW "BM5,186":FOR I=1 TO 4:LET H=100)/
5+3-G:DRAW "D2,R2:U2:L2BM+5,+8":NEXT I
3620 DRAW "BM6,0:D5:R1:U5:BM240,0:D5:R1:U5"
3700 RETURN
3710 PUT(J1,I1)-(J1+15,I1+15),B1,PSET:RETURN
3720 PUT(J1,I1)-(J1+15,I1+15),B2,PSET:RETURN
3730 PUT(J1,I1)-(J1+15,I1+15),B3,PSET:RETURN
3740 PUT(J1,I1)-(J1+15,I1+15),B4,PSET:RETURN
3750 PUT(J1,I1)-(J1+15,I1+15),B5,PSET:RETURN
4000 REM*****
4010 REM LANDING?
4020 REM*****
4030 LET X1=INT((X-31)/16)
4040 LET Y1=INT((Y-23)/16)
4050 IF X1<0 OR X1>10 THEN LET X1=999
4060 IF Y1<0 OR Y1>10 THEN LET Y1=999
4070 RETURN
4500 REM*****
4510 REM INSTRUCTIONS
4520 REM*****

```

```

4530 CLS:PRINT:PRINT"SANTA'S POSTAL SERVICE IS IN DEEP TROUBLE."
4540 PRINT:PRINT"DELIVERIES ARE OVERDUE AND THE REINDEER ARE RUNNING OUT OF
PUFF."
4550 PRINT:PRINT"CAN YOU HELP?"
4560 PRINT:INPUT "PRESS 'ENTER' TO FIND OUT MORE":GOTO CLS
4570 PRINT:PRINT "IF YOU DO WANT TO HELP,SANTA WILL GIVE YOU 40 PRESENTS TO
DELIVER."
4580 PRINT:PRINT "SINCE THAT ISN'T ENOUGH TO COVER THE WHOLE TOWN,THE IDEA IS THAT
YOU Toss THEM DOWN THE CHIMNEYS OF THE POOREST HOMES--YOU CAN TELL THEM BECA
USE THEY HAVE THE LOWEST CHIMNEYS."
4595 PRINT:INPUT "PRESS 'ENTER' TO FIND OUT MORE":GOTO CLS
4590 PRINT:PRINT "TO HELP YOU IN YOUR TASK THE TOWNSFOLK HAVE LABELLED THEIR
CHIMNEYS LIKE DICE--THE LOWER THE NUMBER THE LOWER THE CHIMNEY."
4600 PRINT:PRINT "IN Tossing THE PARCELS YOU HAVE TWO FORMS OF CONTROL. YOU CAN
CHOOSE THE DIRECTION AND THE STRENGTH OF YOUR THROW."
4610 PRINT:INPUT "PRESS 'ENTER'":GOTO CLS
4620 PRINT:PRINT "YOU CHOOSE THE DIRECTION BY PRESSING ANY KEY WHILE THE
DIRECTION INDICATOR LINE IS TRAVELLING AROUND THE TOWN. THE LINE WILL STOP
AND YOUR THROW WILL TRAVEL FROM YOUR POSITION ABOVE THE BLANK SQUARE IN THE"
4630 PRINT "MIDDLE OF THE TOWN, TOWARDS THE END OF THE LINE."
4640 PRINT:INPUT "PRESS 'ENTER'":GOTO CLS
4650 PRINT:PRINT "TO CHOOSE THE STRENGTH OF YOUR THROW YOU MUST WAIT UNTIL THE
STRENGTH INDICATOR LINE TRAVELS ACROSS THE TOP OF THE SCREEN, THEN STOP IT BY PRE
SSING ANY KEY. THE LONGER YOU LET IT GO THE HARDER THE THROW."
4660 PRINT:PRINT "AS THE PRESENT FALLS TOWARDS THE CHIMNEYS ITS HEIGHT IS INDICAT
ED BY A LINE ON THE RIGHT OF THE SCREEN."
4670 PRINT:INPUT "PRESS 'ENTER'":GOTO CLS
4672 PRINT:PRINT "TO GET A PRESENT DOWN A CHIMNEY IT MUST ENTER FROM THE TOP."
4674 PRINT:PRINT "ONCE A PRESENT HAS BEEN DELIVERED TO A PARTICULAR
CHIMNEY IT CHANGES COLOUR SO THAT YOU DON'T WASTE ANOTHER PRESENT ON IT."
4676 PRINT:INPUT "PRESS 'ENTER'":GOTO CLS
4680 PRINT:PRINT "ONE FINAL PROBLEM--AS MENTIONED,REINDEER ARE GETTING TIRED. TH
IS MEANS YOU ARE LOSING HEIGHT,SO BETTER TRY AND HIT THE FURTHEST CHIMNEYS FIRST
--LATER ON YOU MAYNOT BE ABLE TO!"
4690 PRINT:PRINT "AT THE END OF YOUR 40 PARCELS YOU WILL RECEIVE A SCORE
REFLECTING YOUR SUCCESS IN REACHING THE LOWEST CHIMNEYS."
4700 PRINT:INPUT "PRESS 'ENTER' TO START":GOTO CLS:RETURN

```




Ian McNaught Davis (left), Presenter, and (right), David Allen, Producer, of BBC television's forthcoming computer programme.

Getting down to Basics

David Kelly talks to David Allen, producer of BBC tv's second computer programme series.

The question of whether or not the BBC should ever have become involved in the manufacture and marketing of a micro-computer is still subject to debate.

Detractors are keen to point out that, not only did the failure of Acorn to satisfy delivery schedules do the BBC's reputation harm, but the offending machine had virtually no part to play in the television series, *The Computer Programme*.

A year later the tables have been turned — the Acorn machines are readily available and a second series on micros called *Making the Most of Your Micro*, focusing on programming and applications, is due to be broadcast from next January.

"The first series was designed for people with no experience of microcomputing," says David Allen. "But, somewhere along the line, people got the idea that we were doing a series dealing with programming a micro, which was not at all what the first programmes were about."

"However, that is pretty much how we see the new series. It will be for those already with machines and will deal directly with programming techniques. But without the first series, this new one would not have been possible."

The 10 new programmes will concentrate on what can be achieved with a computer — the emphasis being firmly on the practicalities involved. "Each programme will take a theme and concentrate on what you can do with your machine — hence the series title — *Making the Most of Your Micro*."

"Obviously, people have different machines. We shall have Pets, ZX81s and so on, but for the studio demonstrations of programming techniques we shall use the BBC micro."

"As far as possible we shall try to deal

with common ground on the different machines. But, there comes a point when we have had to say 'The actual detailed code will be different from this on other machines, though the principles are the same'. So yes — it is difficult to please everyone and yes it is a compromise — but there is no way round that."

"What we hope to do is to send out the programs we develop, both in cassette form and over the air using Ceefax. When we do this we will develop versions for most machines."

January will see the launch of a new telesoftware service to coincide with screening of the television programmes.

Each programme in the new series will have a main theme around which the various items in the 30-minute show will centre. The series will be presented by Ian McNaught Davis with contributions in each episode from a selection of experts. The plans for the series break down as follows.

Part 1. The Versatile Machine. This first one acts as a shop window for the rest of the series. It gives a brief idea of just what is possible with low-cost microcomputers. It begins with a remarkable item on Richard Gomm, severely disabled with cerebral palsy, who finds a micro-computer invaluable in his studies for a PhD in philosophy. Then John Coll of Acorn briefly tours the components that go to make up a micro and Ian McNaught Davis steps inside a computer to walk around the main hardware accoutrements on the printed-circuit board.

Part 2. Getting Down to Basics. Whatever dialect of Basic your machine uses, there are still only three central programming structures — sequential, branch and loop. The concept of numerical variables is also introduced.

Part 3. String handling. Introduces procedures and sub-routines. Looks at an example of good and bad programming technique.

Part 4. Graphics. This programme attempts to describe simple graphics programming techniques, introduces the idea of machine-code and shows how to address individual pixels in an 8 x 8 one-character area. Different levels of resolution are considered, as are the commands *Move*, *Draw* and *Plot*. An animation cell is shown which is developed to explore in-betweening and other more advanced animation techniques, and takes a brief look at commercial computer-aided graphics like those seen in the film, *Tron*.

Part 5. Databases. This part looks at simple file handling — data processing, searching and sorting. Shows how to construct a simple database.

Part 6. Business Applications. Considers the ways in which low-cost home micros can be used in a small business. Shows a typical spread-sheet financial modelling program. Briefly considers word-processing programs and illustrates some of the main pitfalls of writing your own software.

Part 7. Getting Away From Basic. Looks particularly at the idea of artificial intelligence.

Part 8. Control. Using a micro to control external apparatus. A BBC Buggy will be displayed (which will be available to buy) and operated from the BBC micro. It is 'intelligent' in that it senses its environment and builds up a picture of where it has been. It will be able to draw lines and will incorporate a bar-code reader and light sensor.

Part 9. Computer-aided Design and Music. Considers further methods of non-keyboard input to the computer, and also non-screen output. Sound and joystick control. Shows how to draw and manipulate a three-dimensional line drawing on the screen. Shows hidden-line removal, rotation and shading.

Part 10. Communications. Deals with telesoftware. Explains the BBC's Ceefax system. Much of the software developed in the series will be made available for a range of machines using this system.

The BBC microcomputer comes into its own in the new series. "Having a dynamic relationship with one company — Acorn — has been invaluable" says David Allen. "With them we have been able to develop software for the programmes and produce the vital special board which enables us to put up the computer's output clearly on the screen."

"In fact, even the sub-titles which appear on screen — as in the first programme — are generated from the machine."

Making the Most of Your Micro will be broadcast in 10 programmes beginning on January 10. Each episode will be shown three times as follows: Mondays BBC2 3.05 pm; Mondays BBC1 11.25 pm; and Sundays BBC1 12.35 pm.



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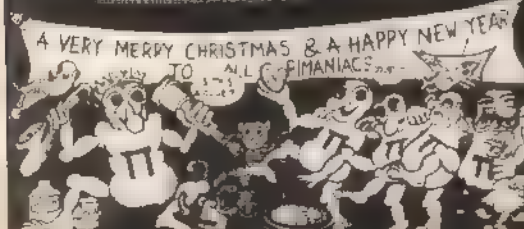


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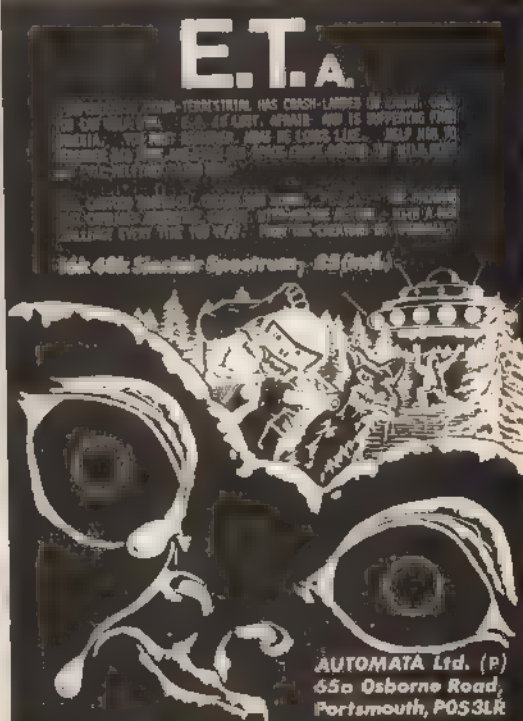
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Inside the black box

Stephen Adams looks at Qsave and the LMX programmer for the ZX81.

Qsave is a hard and software package designed to speed up the *Loading* and *Saving* of tapes with the ZX81. It can save 16K in 30 seconds giving a speed in excess of 4000 bits per second, as against Sinclair's tape speed of 250-300 bits per second.

The hardware is contained in a small black box with four 3.5mm sockets, two per side. This is a filter which fits into the ear lead between the tape recorder and the ZX81. A lead from the power pack also plugs into the unit to power the amplifier inside. The ear and power leads are provided with the unit.

The filter can also be used on its own ■ solve some tape *Loading* problems. It contains a high and low filter, to cut out noise generated by the tape recorder head and the rumble from the mains/tape recorder motor. It also increases the level which is put out to the ZX81, so some adjustment of the tape recorder volume control may be necessary when using the unit.

One snag with the present model is that it must be disconnected when *Saving* a program, ie the lead from the ear socket of the tape recorder must be unplugged. Apart from this, the unit worked very well and considerably improved the *Loading* of Basic tapes.

Software side

The software side of the package comes in the form of a tape which auto-runs when *Loaded* to put three machine code routines into the top of memory. The tape I received had only been set up for using a 16K Ram pack, but there are tapes available for 64K and other memory sizes. The machine code is not large (300 odd bytes) and ■ protected against a Basic program accidentally overwriting it. Only *New*, or pulling out the power plug, will erase it. The three routines, *Load*, *Save* and *Verify*, are called by *Print Usr X*, where *X* is the number of the routine.

The *Qsave* routine is *Loaded* first and then the program required. If this program has been *Qsaved* previously, then it will load in 30 seconds by calling the appropriate routine. If not, it may be loaded by the normal *Load* command and, provided it can be stopped, it can then be *Qsaved*. If, however, it jumps straight into a machine code routine, you will not be able to *Qsave* it. *Qsave* commands can be written into programs, but it is essential that the program is in *Fast* mode before using *Qsave*.

After *Saving*, the *Verify* command can

be used to check that the program on tape is the same as in memory. If it is not, there is no break facility to get back to the main program, so you would have to run it through another *Qsaved* program to get back control.

The advantages of using this system are fairly obvious, but here are a few examples. A data base program using a full 16K takes approximately 11 minutes to load — using *Qsave* it takes 30 seconds. But a 16K games program also takes 30 seconds to load. At present, *Qsave* takes 30 seconds whatever the length of the program.

It also does not use a program name, so it will *Load* the first *Qsaved* program it comes across. However, *Qsave* manufacturer PSS says all these problems have been considered and by the time you read this new software will have eliminated the problems.

I have tried the system with a standard tape recorder and it works very well, if



Qsave can save 16K in 30 seconds.

good tapes are used (PSS recommend the AD or D series from TDK). The volume control had to be adjusted to near enough the bottom level, well below the level I use for the ZX Spectrum or BBC micro. The *Verify* is essential, as is a tape counter to keep track of where the programs are. *Qsave* leaves the screen blank with flashing white lines across the screen, however, it is not possible to tell whether a program will *Load* or not by looking at the lines.

PSS does sell a version which has a switch on it to eliminate the disconnection of the *Qsave* box when recording. This I feel is an essential requirement.

The documentation that comes with the system is in the form of a four-page booklet containing simple instructions and diagrams and an emergency telephone number.

I think *Qsave* will promote a greater use of the ZX81, as it allows you to have near enough the speed of discs on an ordinary tape recorder. The only thing that is missing is the ability to store just the variables or code on to tape using *Qsave*.

Qsave is manufactured by Personal Software Services, 112 Oliver Street, Coventry CV6 5FE (Tel: 0203 667556) and costs £15.95 for 16K and £17.95 for 64K.

LMX programmer

The LMX PROM programmer was designed to work on the minimum 1K ZX81 and so has a few limitations. One of these is that it can only cope with one type of Eprom ■ Rom that can be reprogrammed), the 2716. However, this is available from various manufacturers and it can hold up to 2K of machine code.

The board ■ easy to build if you have a little soldering experience. The instructions are easy to follow and the technical details are fully explained. If, however, you want to use it with a 16K Ram pack, extra wire must be provided to connect up the pcb edge on the far side of the programmer. Also, the program ■ control the programmer, which is supplied on tape, is written in machine code for 1K and produces a peculiar display with the 16K pack.

The programmer is roughly decoded so that it occupies the whole of the 8K-16K space on the memory map and also appears on the 40K-48K section. This means it ■ not suitable for use with Ram packs of 32K or above. The Eprom is programmed by writing to the memory location required in the Eprom with a 30-36 volt battery applied to the board. This battery can be made of four PP3s, as shown ■ the notes.

In the program supplied you can change the address to anywhere in a 2K range and alter the memory location. All addresses and data are in hex, so conversions must be done with the aid of the ZX81 manual if you are working ■ decimal. The instructions to increment/decrement and burn are ■ single key from the keyboard, using the overlay provided. An led on the board lights normally and goes out when burning data into a location. The program has an error check to stop you programming a location that has already been done.

With a 1K ZX81 this is a very cheap way to program Eproms to store machine code programs (Basic cannot be stored ■ it), but if you have expanded your machine in any way it is a bit limiting. The programming could have been done just as easily with Basic using *Poke* to program the Rom and *Peek* to check it. Then a large array of data could have been dumped into the Eprom by the ZX81, rather than having to enter it all from the keyboard.

The LMX Prom programmer is available from Lander Microsystems, 32 Clockhouse Lane, Colliers Row, Romford, Essex RM5 3QJ (Tel: 0708 28325) for £17.50 as a kit, excluding batteries and Eprom.

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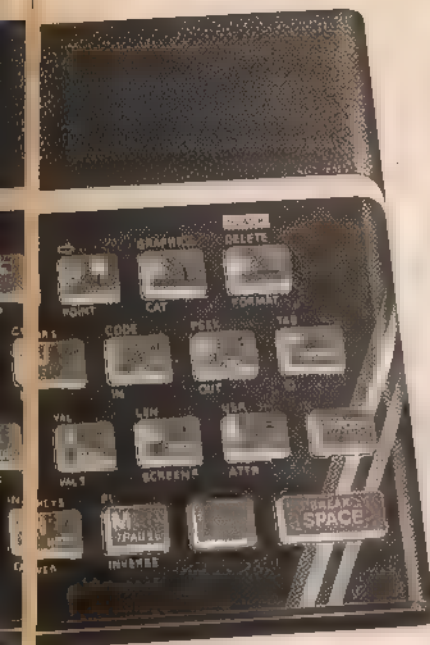
There's no need to stop there. The ZX Printer—available now—is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



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- High speed LOAD & SAVE—16K in 100 seconds via cassette, with VERIFY and MERGE for programs and separate data files.
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um



The ZX Printer—available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set—including lower-case characters and high-resolution graphics.

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Scrambled Border

on Spectrum

An interesting effect which will enhance some games programs is the scrambling of the screen border, with or without a warning buzz.

The effect relies upon the output of values to port 254 (which controls the speaker and the border colour) of certain values, using the *OutBasic* instruction. It is not necessary to have any external ports

connected.

The accompanying program will serve to illustrate that the screen border may be made to stripe in various colours without disturbing the screen display area. A buzz may be added, if required, by subtracting 24 from the values given in the table. The two *Out* instructions simply change the border colour from white to the chosen colour repeatedly.

If the speaker bit is set then a buzz is produced by the repeated setting/unsetting of the speaker which gives a click.

```
1 REM Scrambled border by P N
2000 PRINT "hello"
2010 FOR J=1 TO 100
2020 OUT 254,255
2030 OUT 254,N2
2040 NEXT J
2050 PRINT "ok"
2060 STOP
```

Data values for port 254
(This drives speaker & border)

Value of N2	Effect
255	White
254	Yellow
253	Blue
252	Green
251	Magenta
250	Red
249	Blue
248	Black

Subtract 24 from N2 to add buzz

Scrambled Border
by Paul Newman

Poster

on BBC Micro

This simple routine utilises the BBC's *Point* (X,Y) statement to reproduce characters displayed on the screen, greatly enlarged, on a print-out.

The *Rem* statements explain the restrictions on the size of the poster characters and on the length and depth of the whole poster. The X and Y loops take the *Point* (X,Y) statement from the bottom of the first screen line to the top of the screen and from the left of the screen to the right.

Lines 240 and 250 serve to find what character is printed and use that character form to print the enlarged version of that character on the print-out. Unfortunately the printing character is at right angles to the poster character. If this is unacceptable X can be printed instead by replacing line 290 with

```
290 LET B = ASC("X")
```

The W loop sets the maximum character width and the H loop the maximum character height. The alterations for *Mode 4* operation are to take account of the fact that the *Mode 4* screen width is half that of the *Mode 0* screen width.

The routine will print the whole of the contents of the first line regardless of how large the poster string is. To save time once the poster string has been printed *Escape* can be pressed to terminate the program.

The program does not use graphics characters so any printer should be suitable. To convert the program for use on other computers with a *Point* (X,Y) statement the lines using the screen dimensions (Lines 230, 240 and 270) may have to be altered and the equivalent of the *Vdu* statements used. Note that *Vdu* 1,10 sends a line feed to the printer only.

10REM POSTER

20REM **A PROGRAM TO PRINT BIG CHARACTERS**

30CLS

40PRINT

50REM Maximum width and maximum height

60REM must both be multiples of 8.

70PRINT"Max. width of each character ";

80INPUT WID

90PRINT

100PRINT"Max. height of each character ";

110INPUT HEIGHT

120PRINT

130REM Poster string must be less

140REM than 80 characters long.

150PRINT"Poster string ";

160INPUT A\$

170CLS

180MODE 0

190PRINTA\$

200VDU 2 REM Printer on.

210W1=WID/8

220H1=HEIGHT/8

230FOR X=0 TO 1279 STEP 2

240LET A=(X DIV 16)+1

250LET B=MID\$(A\$,A,1)

260FOR W=1 TO W1

270FOR Y=991 TO 1023 STEP 4

280LET P=POINT(X,Y)

290LET B=ASC(B\$)

300LET C=ASC(" ")

310FOR H=1 TO H1

320IF P=0 THEN 350

330VDU 1,B

340GOTO 360

350VDU 1,C

360NEXT H

370NEXT Y

380VDU 1,10

390NEXT W

400NEXT X

410VDU 3

REM Printer off.

420END

430REM Changes for MODE4 operation.

440REM 130REM Poster string must be less

450REM 140REM than 40 characters long.

460REM 180MODE 4

470REM 230FOR X=0 TO 1279 STEP 4

480REM 240LET A=(X DIV 32)+1

Poster

by Clive Stokes

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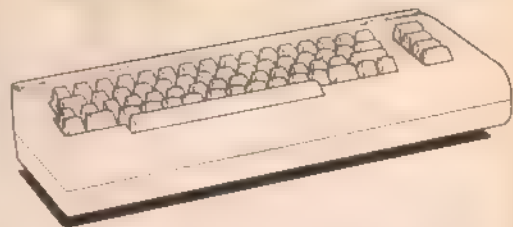
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Spirals

on ZX81

Here are two programs for drawing spirals. The circular routine is done by drawing half circles one at a time.



Spirals
© Andrew Astrand
Aged 19

```
5 INPUT "Enter the scale of the spiral " : Y : INPUT "Enter the ink colour " : I : INPUT "Enter the border colour " : B : INPUT "Enter the paper colour " : P
10 INK I : BORDER B : PAPER P : C
45 LET X=0 : PLOT 128,0
20 DRAW X,X,P1 LET X=X+Y : G0
30 SUB 37 : DRAW X,X,P1 LET X=X+Y
50 SUB 37 : G0 TO 40
37 IF X=128 THEN G0 TO 5
30 RETURN
40 G0 TO 20
```



Spirals 2
© Andrew Astrand

```
5 INPUT "Enter the scale of the spiral " : Y : INPUT "Enter the ink colour " : I : INPUT "Enter the border colour " : B : INPUT "Enter the paper colour " : P
20 PLOT 0,0 : LET X=178 : BORDER B : PAPER P : INK I : CLS
30 DRAW Y,0,X : LET X=X-Y : G0
SUB 40 : DRAW 0,X : LET X=X-Y : G0
SUB 40 : DRAW X,X : LET X=X-Y : G0
SUB 40 : DRAW 0,-X : LET X=X-Y : G0
SUB 40 : G0 TO 30
40 IF X=0 THEN G0 TO 5
50 RETURN
60 G0 TO 30
```

Spirals

by Andrew Astrand

Morse code tutor

on ZX81

Several morse tutor programs for the ZX81 have been published but they all suffer the same disadvantage; namely — that the morse is not taught as it should be — by sound. It is absolutely no use whatever learning that 'dot dot dot' is 'S', it takes too long to interpret. Morse reading must be instinctive and this can only be achieved by any degree by learning the sound pattern.

This program, designed for the ZX81 1K, generates morse code at a preset speed, ranging from around five words per minute (very slow), to about 25 words per minute (about twice the Radio amateurs exam standard). Chosen groups of characters may be learned by simple changes to the program.

Construction of the program

First enter a line 1 REM followed by 39 dots and *Poke* the contents of the table into this storage area. The last three bytes of the table are a simple machine code program to make the 'buzz'. Next, edit line 1 to add, in the order shown, the series of letters and numbers — 36 in all. The first 36 bytes entered in the Rem are a look-up table of the morse characters in coded form.

They are actually the morse sequence in binary, 'dot' = 0 and 'dash' = 1. Simple division by two will yield each successive character in turn — see lines 90 and 140. The sequence in lines 110 to 120 creates a buzz for each character. The construction in line 110 gives a long buzz for a dash and short for dot, the ratio of 3:1 being preserved no matter what the speed chosen.

Enter the rest of the program as listed, omitting all other Rems if you only have 1K. The letter-table in the last 36 bytes of line 1 shows the 'natural' sequencing of

morse when graded by ease of learning: viz I S H / T M O / A U V / N D B / W J C K / P G R L / Q Z F X Y / and 1 2 3 4 5 / 6 7 8 9 0 / . Line 40 sets this and is for the whole code as given.

To alter this to say /E I S H/ place the Code for '4' instead of '8' i.e. generate a number between 1 and 4. Other pointers may be set in a similar manner. The printer buffer is used as 'free' storage space and does not affect the printer, if plugged in.

Speed is set by line 5 and is variable between the practical limits of 5 and 25 wpm. Morse is heard by either monitoring the 'mic' line with a small amplifier, or

turning up the TV sound and perhaps slightly de-tuning the video. The screen display collapses while morse is being sent. (It cannot be sent in *Slow*). When the display is restored, you simply enter the characters you received (use Newline as 'don't know') one at a time. If you were correct the character is printed. If wrong then the correct one is printed reversed video.

With more memory it is desirable to make the program easier to use by adding menu selection of speed and letter groups as well as better screen display of checking. This is left to you!

```
1 REM "MORSE CODE TUTOR"
2 "BY PAUL NEWMAN"
3 "VERSION 1.0"
4 "1982"
5 "SPEED: 5"
6 "1"
7 "2"
8 "3"
9 "4"
10 "5"
11 "6"
12 "7"
13 "8"
14 "9"
15 "0"
16 "1"
17 "2"
18 "3"
19 "4"
20 "5"
21 "6"
22 "7"
23 "8"
24 "9"
25 "0"
26 "1"
27 "2"
28 "3"
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35 "0"
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225 "0"
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228 "3"
229 "4"
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232 "7"
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234 "9"
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247 "2"
248 "3"
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251 "6"
252 "7"
253 "8"
254 "9"
255 "0"
256 "1"
257 "2"
258 "3"
259 "4"
260 "5"
261 "6"
262 "7"
263 "8"
264 "9"
265 "0"
266 "1"
267 "2"
268 "3"
269 "4"
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274 "9"
275 "0"
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281 "6"
282 "7"
283 "8"
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LINE 1 REM VALUES

16514	8	16516	4
16516	8	16517	16
16518	3	16519	7
16520	15	16521	6
16522	12	16523	24
16524	5	16525	9
16526	17	16527	14
16528	30	16529	21
16530	13	16531	22
16532	11	16533	18
16534	18	16535	27
16536	10	16537	20
16538	28	16539	29
16540	62	16541	60
16542	35	16543	45
16544	32	16545	33
16546	38	16547	39
16548	47	16549	63
16550	211	16551	223
16552	201		

Morse Code Tutor

by Paul Newman

Sailors' Hornpipe

on Jupiter Ace

This is a Forth program written to run on the unexpanded Jupiter Ace. The program plays "The Sailors' Hornpipe" three times with increasing speed on each repetition.

Load the program from the cassette by typing "load hornpipe" and then pressing "ENTER" whilst the tape is playing. When the program is loaded it may be run by typing "hornpipe" and then pressing "ENTER". To enter the program from the listing simply type in the listing pressing "ENTER" after each definition. The spaces in a Forth program are very critical especially after the colon at the beginning of a definition and before the semi-colon at the end of a definition. (This will all be obvious to a Forth user).

Chapter 11 in the Jupiter Ace handbook is very helpful about how to use the BEEP command when playing tunes. I have modified the suggested method of playing tunes in the following ways:

1. Instead of giving the numerical value for the pitch of the note each time it is played I have defined the pitch of each note I use as the letter name of that note at the beginning of the program.

The tune is in E major so C, D, E and F should all be sharps, however, I omitted the sharp signs to make the typing simpler. The note A does become A sharp a couple of times so I had to define an A# note.

2. There are only two lengths of notes in the tune (semi-quavers and quavers) so I defined a standard note length DURATION and included this in two definitions, S (for short note) and L (for long note).

With this set-up the tune can be written very easily in a definition by typing the letter name of the note followed by its duration, either long or short. This general method could be used for any tune. I don't think it is worth defining a three octave set of named notes in semi-tone intervals which could be a universal tune-making set because this takes up too much memory in the unexpanded Ace.

The tune may be played at any speed the user likes by typing a number for the duration of the whole and following this by DURATION. eg: 20 DURATION. I WHOLE will play the tune so quickly that the individual notes are not discernable.

```
253 CONSTANT B
285 CONSTANT C
291 CONSTANT D
```

```
190 CONSTANT E
169 CONSTANT F
150 CONSTANT G
142 CONSTANT A
134 CONSTANT A#
127 CONSTANT BB
113 CONSTANT CC
100 CONSTANT DD
95 CONSTANT EE
84 CONSTANT FF
75 CONSTANT GG
100 VARIABLE DURATION
```

```
:L DURATION @ 2 * BEEP:
:S DURATION @ 1 * BEEP:
```

```
:PART1 EE SDD SEE LEL LBB SAGSBB S
EE SDD SEE SGG SFF SEESFF LFLF
LFS SDFS SBB A# SBB L:
```

```
:PART2 CC SDD SEE SDD SCCSBB SCCSBB S
ASGSASGSFSESESDSCSBBSCS
ESDSFSESGSFSASGLELEL:
```

```
:PART3 BB SAGSBB SEE SBB SGBBSEE
SBB SCCLALALCCSBB S# SCCS
FFSCCSA# SCCSFFSCCSD LBB L
BBL:
```

```
:WHOLE PART1 PART2 PART1 PART2 PART3
PART2 PART3 PART2:
```

```
:HORNPIPE CLS 5 AT "The Sailors' Hornpipe"
120 DURATION I WHOLE 90
DURATION I WHOLE 60 DURATION I
WHOLE:
```

by Simon Cross

Carols

on Vic20

As it is getting near to Christmas I wrote a program to play some carols.

This program is for use with a super

expander and it uses the music capabilities of the super expander. The program gives you the choice of seven carols.

At the beginning of the music lines, e.g., line 220, you have to put a Ctrl- because the printer misses them.

Carols

by Alan Blackham

```
3 REM *****
4 REM * ALAN BLACKHAM'S *
5 REM * CHRISTMAS CAROLS*
6 REM * (22/10/82) *
7 REM *****
10 COLOR 0,0,1,1
20 SCNCLR
30 PRINT"MENU OF OPTIONS."
35 PRINT"
40 PRINT"1..THE FIRST NOEL."
45 PRINT"2..HARK THE HERALD
ANGELS SING."
50 PRINT"3..GOOD KING
WENCESLAS"
55 PRINT"4..SILENT NIGHT,"
60 PRINT"5..JINGLE BELLS,"
62 PRINT"6..WHILE SHEPHERDS
WATCH,"
64 PRINT"7..AWAY IN A MANOEUV,"
85 PRINT"8..EXIT PROGRAM."
90 PRINT"TYPE THE NUMBER NEXT TO THE
TUNE."
100 REM ** GOTO LINE REQUIRED **
110 GETA$:IFA$=" "THEN110
120 IFA$="1"THEN 200
125 IFA$="2"THEN 300
```

```
130 IFA$="3"THEN 400
135 IFA$="4"THEN 500
140 IFA$="5"THEN 600
142 IFA$="6"THEN 650
144 IFA$="7"THEN 700
185 IFA$="9"THEN PRINT"FINISHED":END
190 GOTO 110
200 REM ** THE FIRST NOEL **
210 PRINT"THE FIRST NOEL."
215 PRINT"
220 PRINT"02T5EDT6CT5DEFT6GT4AB
T503C02BAT6GT4AB"
230 PRINT"T503C02BAGAB03C02GT6ET4ED"
240 PRINT"TSCT4DEFT6GT4ABT503C02BAGT4AB"
245 PRINT"03T5C02BAGAB03C02GT6ET4ED"
250 PRINT"TSCT4DEFT6GT403C02BT6AT5AT6G
T503C02BAGAB03C02GT7E"
270 RUN
300 REM ** HARK THE HERALD ANGELS SING
**
310 PRINT"HARK THE HERALD ANGELS
SING"
315 PRINT"
320 PRINT"02T5DGT4#FT503BA03DDT4C02T5
BAT6BT5"
```

To next page


```

325 PRINT"DOGT4#FT5GBBA03D02AAT4GT5#FET
6DT5"
330 PRINT"03DD02T4GT503C02BBA03DD02
T4GT503C02BBA"
332 FORI=1TO2
335 PRINT"03EEET4BT5C02BT603C02T5AT4
B03CT5D02GGAT6BT5"
340 PRINT"03EEET4DT5C02BT603C02T5AT4
B03CT5D02GGAT7G"
350 RUN
400 REM ** GOOD KING WENCESLAS **
410 PRINT"GOOD KING WENCESLAS"
415 PRINT" "
420 PRINT"02T500GA0GT6DT5EDE#FT60GT5"
430 PRINT"00GAGGT6DT5EDE#FT60GT5"
435 PRINT"03DC02BBA0T6GT5EDE#FT60GT5"
440 PRINT"DDE#FGGT6AT503DC02BAT7003
C02T8G"
450 RUN
500 REM ** SILENT NIGHT **
510 PRINT" SILENT NIGHT."
515 PRINT" "
520 PRINT"02T6GT5AT6GT7ET6GT5AT6GT7E03D
T6DT702B03CT6CT702GAT6A03"
530 PRINT"C02T5BT6AGTT5AT6GT7EAT6A03C02
T5BT6AGT5AT6GT7E03DT6DT5D02T6B03T7C"
540 PRINT"ET6C02G0T5FT6DT8C"
550 RUN
600 REM ** JINGLE BELLS **
610 PRINT" JINGLE BELLS."
615 PRINT" "
620 PRINT"02T5BBT6BT5BBT6BT5B03D02GT4AT
6B03T5CCCT4C"
625 PRINT"T4C02BT5BT4BBA0T5AT4B
BT5BT4BBT5BT4B03D02GT3AT5"
630 PRINT"B03T4CCCT3CT4C02BBT3BT403DDC0
2AT5GT4R"
635 PRINT"DBAGT5DT4DBAGT5ET4E03C02BA"
640 PRINT"03DDDT3DT4ED02A#AT5BT4DBAGT5D
T4DBAGT5ET4E03C02BA03DDDT3D
T4EDC02AT5GT4"
645 PRINT"02T4BBT5BT4BBT5BT4B03D02GT3A
T5B03T4CCCT3C"
647 PRINT"T403C02BBT3BT403DDC02AT6G"
649 RUN
650 REM ** WHILE SHEPHERDS WATCH **
655 PRINT"WHILE SHEPHERDS WATCH";
660 PRINT" "
670 PRINT"02T50BT4BT5A003CC0
2BBA03DD#C02T603D02T5B"
675 PRINT"03ET4DT5C02BAG#FBAGG#FT7G"
680 RUN
700 REM ** AWAY IN A MANGER **
710 PRINT"AWAY IN A MANGER"
715 PRINT" "
720 PRINT"02T5CFFT4GAT5FFT4AB03T5CCD02
T6#BT50A#B#B03C02AAT4FAT5GDT6ET5C"
725 PRINT"FFT5GAFFA#BT403T5CCD02T6#BT4
GAT5#B#B03C02AAT4FAT6GDET7F"
730 RUN

```

READY.

Blockshift

on BBC Micro

Functions, procedures and calls on a micro are extremely useful. They allow you to expand the instruction set of your computer without the complication of re-directing the error handling routines or other such nasties.

A good example of the use of calls is on the RML 380Z, for when the high res graphics board is installed, the standard Basic has no instructions to cope with line drawing or plotting, so instead of redesigning a major part of the interpreter, machine code routines are added. When the Basic is loaded in, so are the routines. To use these you must then access them through the Basic command CALL, e.g., BBC Basic's MOVE X,Y becomes CALL "PLOT",X,Y,Z.

Because the Basic is in Ram, it is possible to alter the instruction set, or to add more commands and then save the modified version for a later date. Most home computers have their languages in

Rom so although it is very difficult to alter the standard instruction set you can easily add your own routines and load them in off tape/disk into a spare bit of memory.

What follows is for the BBC micro, but the general ideas might be of some interest to users of other computers.

BBC Basic is extremely fast and is adequate for most purposes. There is one area where I continually find a need for a fast simple alternative and that is when dealing with the graphics. Any Basic is going to be pushed to shift around 20K of memory in under a second.

If you look in your back copies of PCW, Vol 1, No. 16, page 15, you will find a routine to scroll the screen. We will use that and the program in this article to demonstrate how to add more commands via CALL and PROC.

To execute the scrolls, the only thing needed is to say 'CALL RSCROLL' and the whole screen shifts sideways, however the 'BLOCK' program copies a specified section of the screen to another specified position. Therefore, we need a way of passing these parameters to the machine

code. It is possible to use CALL but with the parameters included after the name, however, this would involve a lot of nasty calculating (working out the start addresses and the number of times the loop must be executed) and since this only has to be done once, it is much easier for Basic to deal with the maths and let the m/c deal with the donkey work of shifting the memory about.

To use the 'BLOCK' you must use PROC.BLOCK (bottom left X,Y, top right X,Y, final top left X,Y). This sets up the hex locations 70,71 with the start address of the portion of screen to be copied, 72,73 with the start of the destination, 76,77 with the number of bytes in one horizontal line of the specified block of screen. The X register is also set to the number of lines to be copied.

When this is done, the procedure calls the m/c which uses the values previously calculated to shift the required memory.

The way to save the m/c of both programs is as follows. First, type in lines 290 to 430 of 'BLOCK' then add on to the end

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of that the lines of any other routines you have (e.g. 50-250 of Scroll). Remember that the last thing must be the instructions in line 440. You must now find out how long the code is. One way of doing this is to add a label FINISH after the last m/c instruction.

The length is now found simply by subtracting the first label from FINISH. A good place to put the code is just before the graphics memory. To find out where the code starts use (&2FFF-(length of code)). Set P% to this instead of DIM P% and call setup again. Now save the section of memory required using +SAVE "ROUTINES" (start of code in hex) 2FFF.

Lastly, make a note of the addresses stored in the variables used to call the routines (in the 'block shift' only the variable BLOCK would be needed).

Now you can write your graphics program which use the routines, remembering of course that you must +LOAD "ROUTINES" before running the program and that the first lines should set the variables such as BLOCK and ASCROLL with the start addresses of the routines.

BLOCK SHIFT works in modes 0,1,2 and regards the screen as a 80 x 32 grid (mode 0 text). The first four parameters define the rectangle to be copied, the last two the position where the copy will be placed. As it stands, the program works well.

If you intend to use it I would advise you to provide some data validation at line 195, since if by some mistake the bottom left Y coordinate is made less than the top right Y, it is possible that the m/c will make

mincemeat of the program which you spent hours perfecting and forgot to save before running.

In line 340 there are two 'no operation' codes. Normally when the code is executed the block of screen is copied exactly. However, if the Basic program places some new instructions instead of the NOP's different effects can be produced.

If EOR #255 was used, everything copied would be inverted (lines 30 and 70 do this). If you do not require this delete lines 320 and 330. If the Basic program is quite long, it would be better to say +SAVE "PROG" E00 2FFF, LOAD "PROG".

This would then load in the m/c as well as the Basic, but be careful that your program is not too long or it will overwrite the m/c.

```

5 REM**BLOCK SHIFT*GLJ OCT82**
10 PROC_SETUP
20 MODE0
25 REM*****MODE0 DEMO*****
29 REM**change NOP NOP to EOR #0 **
30 ?FUNCTION=&49:FUNCTION?1=0
40 FOR L%=&T0359STEP2:A=RAD(L%):B=60*SIN(A*2)
50 PLOT69,B*SIN(A)+50,B*COS(A)+60:NEXT
60 FOR V%=&T031STEP4:FOR W%=&T075STEP6
70 FUNCTION?1=FUNCTION?1 EOR 255
80 PROC_BLOCK(0,31,5,20,W%,V%):NEXT NEXT
90 TIME=0:REPEAT UNTIL TIME>200:MODE2
95 REM*****MODE2 DEMO*****
100 FOR L=1TO100:GCOL0,RND(7):DRAW RND(1280),RND(512):NEXT
110 PROC_BLOCK(0,31,79,16,0,0)
120 TIME=0:REPEAT UNTIL TIME>200:MODE1
125 REM*****MODE1 DEMO*****
129 REM**change NOP NOP to ORA(&72),Y **
130 ?FUNCTION=&11:FUNCTION?1=&72
140 VDU19,1,2,0,0,0:FOR W%=1TO3:GCOL0,W%:FOR L%=1TO100STEP2
150 V%=(SQR(10001-L%*L%))-W%*15:PLOT69,L%/3,V%:PLOT69,70-L%/3,V%
160 NEXT NEXT:FOR L%=1TO150
170 V%=RND(75):W%=RND(28):IF V%<5 AND W%>24 GOTO 170
180 PROC_BLOCK(0,31,4,29,V%,W%):NEXT END
182
185 *****
190 DEF PROC_BLOCK(BX,BY,TX,TY,FX,FY)
200 TLCO=&3000+640*TY+8*BX
210 FTCO=&3000+640*FY+8*FX
220 ?&70=TLCO AND &FF: ?&71=(TLCO AND &FF00)/255
230 ?&72=FTCO AND &FF: ?&73=(FTCO AND &FF00)/255
240 DIFF=(TX-BX)*8+8:ADD=640-DIFF
250 ?&76=DIFF AND &FF: ?&77=(DIFF AND &FF00)/255
260 ?&88=ADD AND &FF: ?&89=(ADD AND &FF00)/255
270 X%=BY-TY+1:CALL BLOCK:ENDPROC
275 *****
290 DEF PROC_SETUP:FOR O=&T01:DIM P%500:EOP T O*3
300 .BLOCK:LDA #0:STA &78:STA &79:LDY #0
310 .LOOP:LDA(&70),Y
320 .FUNCTION
330 NOP:NOP
    
```

To next page

from previous page

```

340 STX(&72),Y
350 CLC:LDA#1:ADC &70:STA &70:LDA #0:ADC &71:STA &71
360 CLC:LDA#1:ADC &72:STA &72:LDA #0:ADC &73:STA &73
370 CLC:LDA#1:ADC &78:STA &78:LDA #0:ADC &79:STA &79
380 CMP &77:BNE LOOP
390 LDA &78:CMF &76:BNE LOOP
400 CLC:LDA &88:ADC &70:STA &70:LDA &89:ADC &71:STA &71
410 CLC:LDA &88:ADC &72:STA &72:LDA &89:ADC &73:STA &73
430 DEX:BNE BLOCK:RTS
440 J: NEXT: ENDPROC

```

Blocksheet
by Gareth Jones

Ghost Chase

on Spectrum

The user-definable characters, for Ghost Chase, are set up from line 600. To save readers' aching fingers I have used decimal numbers in the *Data* statements rather than *Bin* numbers, which are then poked into the characters. To help with the speed of the game I have only included *Beeps*

when destruction of either your player or the ghost occurs.

While writing the program I discovered an annoying problem regarding the function *Screen\$(x,y)*, which gives the character at row *x* and column *y* of the screen. The problem is that if the character has a code greater than 127, *Screen\$(x,y)* does not work. For instance, if you use *Screen\$(x,y)* on any character which you have defined it will return a null string as the answer, and

the code of *Screen\$(x,y)* will be 0. The character in lines 120 and 130 is a normal capital *X* and not a graphics character.

Other than this the program is based on a fairly simple idea. In fact the actual routine which appears to make the ghost chase you is at lines 70 and 80. Line 70 adjusts the row in which the ghost is, until it is the same as your player, and line 80 does the same for the column.

```

1 GO SUB 600
2 GO SUB 600
3 LET q=0: LET s=0: LET p=5:
LET h=0
5 BORDER 0: PAPER 0: INK 7: J
LS
10 LET a=INT (RAND*10)+2
15 PLOT 40,0: DRAW 215,0: DRAW
0,160: DRAW -215,0: DRAW 0,-160
20 LET b=INT (RAND*12)+10
30 LET x=2*(INT (RAND*8)+2)
40 LET y=2*(INT (RAND*10))+10
45 LET e=2*(INT (RAND*6))+5: LE
T f=2*(INT (RAND*6))+10
46 IF e=x OR e=y OR f=y OR f=x
THEN GO TO 48
47 PRINT AT 0,1: PAPER 2:"X"
48 IF q=p THEN GO TO 50
49 LET q=p: FOR z=0 TO 7-p: GO
TO 45: NEXT z
50 PRINT AT x,y: INK 5:"I": LE
T v=x: LET w=y
60 PRINT AT a,b: INK 6:"A": LE
T c=a: LET d=b
70 LET a=3-(x*(a)+(y*(b)
80 LET b=6-(y*(b)+(x*(a)
90 LET x=x+2*(INKEY$="6")-2*13
NKEY$="7")
95 LET x=x+2*(x*(1)-2*(x*20)
100 LET y=y+2*(INKEY$="8")-2*13
NKEY$="5")
105 LET y=y+2*(y*(6)-2*(y*23))
110 PRINT AT v,w: "AT C,d: "
115 IF a=x AND b=y THEN GO TO 4
60
120 IF SCREEN$(a,b)="X" THEN G
O TO 200
130 IF SCREEN$(x,y)="X" THEN G
O TO 300
140 GO TO 50
200 PRINT AT a,b: FLASH 1:"E"
210 FOR d=2 TO 12 STEP 4
211 BEEP d/200,-15
212 NEXT d
215 PRINT AT a,b: "
216 LET s=s+10
217 PRINT AT 10,0: PAPER 4: FLA
SH 1:"SCORE"
218 PRINT AT 12,0: FLASH 1: PAP
ER 0:"
220 GO TO 10
300 PRINT AT x,y: FLASH 1:"X"
310 FOR d=20 TO 1 STEP -1
311 BEEP d/200,25
312 NEXT d
315 PRINT AT x,y: "
316 LET p=p-1: IF p=0 THEN GO T
O 500
320 GO TO 10
400 PRINT AT x,y: FLASH 1:"X"
410 FOR d=1 TO 10
411 BEEP .01,INT (RAND*80)-25
412 NEXT d

```

```

410 PRINT AT x,y: " ": PRINT AT
0,f: "
415 LET p=p-1: IF p=0 THEN GO T
O 500
420 GO TO 10
500 PAPER 1: FLASH 1: CLS
510 PRINT AT 10,10:"O U T O F"
AT 12,13:"H E N"
515 FOR n=40 TO -20 STEP -1
516 BEEP .01,n
517 NEXT n
520 FOR d=1 TO 200: NEXT d
530 FLASH 0: CLS
535 PAPER 0: CLS
540 IF h=1 THEN LET h=s
550 PRINT AT 5,10: PAPER 3:"HID
N SCORE": h: AT 10,0: PAPER 5: J
NK 0:"PRESS ANY KEY FOR ANOTHER
GO"
560 LET a$=INKEY$: IF a$="" THE
N GO TO 560
565 LET p=0: LET s=0
570 GO TO 5
600 FOR n=0 TO 7
610 READ d: POKE USR "a"+n,d
620 NEXT n
630 DATA 25,62,42,107,127,127,1
09,73
640 FOR n=0 TO 7
650 READ d: POKE USR "h"+n,d
660 NEXT n
670 DATA 145,62,0,195,0,74,137,
0
680 FOR n=0 TO 7
690 READ d: POKE USR "a"+n,d
700 NEXT n
710 DATA 6,20,6,62,0,6,20,34
720 RETURN
800 BORDER 0: PAPER 0: INK 7: J
LS
805 PRINT TAB 5: INK 6: FLASH 1
:"G H O S T C H A S E"
810 PRINT "YOU HAVE 10 LIVES Y
our son (" : INK 5:"I": INK 7:")
around the screen to entice th
e ghost (" : INK 6:"A": INK 7:")
which is chasing you, to run int
o the bomb (" : PAPER 2:"X": PAP
ER 0:"). But be careful you don't
run into the bomb or let the gh
ost catch you. You have 5 lives.
Good luck...
820 PRINT "Press keys "5" -
"6" to move in direction shown
on key"
830 PRINT "FLASH 1: Press any
key to continue"
840 LET a$=INKEY$: IF INKEY$=""
THEN GO TO 840
850 RETURN

```

Ghost Chase
by Jeremy Hall



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Heart of the matter

Asghar Ahmed rolls the bones in an educational game for the unexpanded Vic20.

This program runs on an unexpanded Vic20 and tests your skills on naming various bones in Latin. It starts by drawing a skeleton with arrows pointing to various bones, which you have to name. The score is shown throughout the program. There are five questions which show the graphic make-up of a skeleton.

The next section of the program is named "Bone Test". In this part the computer will give you three questions about bones. When the three questions are up, it plays a tune and displays your final score. This program takes full advantage of the Vic's sound and graphics capabilities.

Program notes

Lines
2 clears the screen and sets the score variable at nought.
4 to 25 graphics for the skeleton.
100 reads a screen location from the data.
110 pokes screen location and colour.
120 waits for you to input an answer.
130 reads the answer from the data.
140 sees if the input is same as the data.
150 displays score.
160 blanks out the arrow then goes to 7, which clears the screen again, but this time printing the arrow at a different bone.
703 clears the screen.
704 set i at 0.
705 to 707 draws the head line.
708 reads a question from the data.
709 reads the answer from the data.
710 prints the question.
720 waits for you to input the answer.
730 sees if the input is the same as the data.
740 displays the score.
750 goes to i which clears the screen and prints the headline again and issues the next question.
800 to 809 are music.
810 to 820 wait for you to press Y or N.
830 if Y is pressed then run.
840 if not print chicken.
2000 onwards are data for colour, arrows, questions, answers and music.

Eliminating long delays

A Collyer explains how to save and load programs with non-standard Basic.

If you own a Vic20 with more than 8K of memory, you probably know you can only have a user definable character set if you move the start of Basic. The problem comes once the program is Saved, because you need to remember to move Basic before Loading.

The following method solves this and allows the character set to be Saved along with the program, eliminating those long

delays at the start of a program while new characters are defined.

First, starting with a fresh system, enter the basic line:

```
POKE 44,30:RUN
```

then type:

```
POKE 45,3:POKE 46,30:POKE 7080,0:
```

```
POKE 43,1:POKE 44,30:NEW (return)
```

This moves Basic to 7680. You can now enter your routine to define a character

set. Once run, it can be deleted. The character generator should start at 5120 (end 7679).

Next, type the program which uses the character set. (Poke 36869,205 will switch to the defined characters). To Save the program and the new characters type:

```
POKE 44,16:SAVE "(program)" (return)
```

When loaded, the program should run as normal using the new character set. ■

READY.

```
1 REM THE SKELETON, BY
  ASGHAR AHMED , 1982
2 PRINT "J" A=0:FOR T=1 TO 5
3 PRINT "  "
4 PRINT "  "
5 PRINT "  "
6 PRINT "  "
7 PRINT "  "
8 PRINT "  "
9 PRINT "  "
10 PRINT "  "
11 PRINT "  "
12 PRINT "  "
13 PRINT "  "
14 PRINT "  "
15 PRINT "  "
16 PRINT "  "
17 PRINT "  "
18 PRINT "  "
19 PRINT "  "
20 PRINT "  "
21 PRINT "  "
22 PRINT "  "
23 PRINT "  "
24 PRINT "  "
25 PRINT "  "
26 PRINT "*****"
100 READ SL,CL
110 POKE SL,31:POKE CL,0
120 INPUT "*****":A$
130 READ R$
140 IF A$=R$ THEN A=A+1
150 PRINT "A" OUT OF T
160 POKE SL,32:NEXT T
702 FOR Q=1 TO 1398:NEXT
703 PRINT "J"
704 FOR I=6 TO 8
705 PRINT "  "
706 PRINT "  BONE TEST  "
707 PRINT "  "
708 READ I$
709 READ N$
710 PRINT I$
720 INPUT A$
730 IF A$=N$ THEN A=A+1
740 PRINT "A" OUT OF "I
750 NEXT I
800 READ N,S
801 POKE 36878,15
802 IF N=0 THEN 809
803 POKE 36876,N
804 FOR D=1 TO 20#S
805 POKE 36879,N-25
806 NEXT D
807 POKE 36876,0
808 GOTO 800
809 POKE 36878,0
810 POKE 36879,27:PRINT:
  PRINT "IF YOU WANT AN
  OTHER GO PRESS (Y/N)"
820 INPUT B$
830 IF LEFT$(B$,1)="Y" THEN RUN
840 PRINT "J":PRINT "*****"
  PRINT "CHICKEN":PRINT "
  *****":END
2000 DATA 77,12,38432,CRANIUM,
  7754,38474,ORBIT
2001 DATA 7956,38676,HUMERUS,
  7977,38719,RIBS,7868,
  38588,CLAVICLE
2002 DATA "WHAT DOES THE BONE
  NEED IN VAST AMOUNTS",
  "CALCIUM"
2003 DATA "WHAT IS THE
  LUBRICATION FLUID
  CALLED", "SYNOVIAL"
2004 DATA "HOW MANY PAIRS OF
  RIBS ARE THERE", "
  TWELVE"
2005 DATA 172.2,181.2,189.2,
  172.2
2006 DATA 172.2,181.2,189.2
2007 DATA 189.2,193.2,200.4
2008 DATA 189.2,193.2,200.4
2009 DATA 200.1,206.1,200.1,
  193.1,189.2,172.2
2010 DATA 200.1,206.1,200.1,
  193.1,189.2,172.2
2011 DATA 172.2,145.2,172.4
2012 DATA 172.2,145.2,172.4
2013 DATA -1,-1
```

READY.



Displayed entries

In part five of our extract from *The Working Spectrum* we continue adding modules/sub-routines to the Unifile program, designed to enable a single program to cover a variety of filing tasks without the need for constant re-writing every time a new use comes along.

Commentary on Module 5

Lines 1680-1720. These lines check that there is room in the file for the new entry.

Lines 1730-1830. The binary search is applied to the entries in B\$. The search is conducted on the basis of the alphabetical order of the first item in each entry. For an explanation of how the Spectrum understands alphabetical order, see page 95 of the Spectrum manual.

Line 1730 finds the highest power of 2 which is still less than or equal to the number of entries in the file. It uses the logarithm function. The search position is set equal to this.

Line 1750. TS is created equal to the first item of the entry in the search position.

Lines 1760-1830. This loop adds or subtracts powers of 2 according to the principles set out in the discussion of binary sorting.

Line 1770. FN A was defined in line 1370. It extracts from two characters in Y\$ a numerical value which is a pointer to the first character of an entry in the main file.

Line 1780. FN AS was defined in line 1380. It extracts from the main file the item whose indicator is found at position C in B\$.

Line 1790. This line needs more explanation. A condition such as TS>US is either true or false but everyday usage it cannot be said to have a value in the same way that a number or a variable has value. For the Spectrum, however, TS>US has a real value which is either 1, if the condition is true, or 0, if the condition is false. The value of the condition can be used in a program in the same way that a number or a variable can. In this particular line if TS<US the condition will have a value of 1 and S will have (2↑K)+1 added to it. On the other hand TS>US will equal 1 and S will have (2↑K)+0 subtracted. If TS had been less than US then the roles would have been reversed, while if TS had been equal to US both conditions would have been false and S would not have altered at all.

Lines 1810-1820. If S, the search position, points to one of the dummy entries, these two lines shunt it back into the main body of the data.

Lines 1840-1850. Having completed the binary search, the item at the selected position is extracted for examination. If the item is this position and the new item are equal, the new item is numbered after the existing item. If they are not equal then the new item is numbered before the existing item.

Line 1870. The new entry is added to the end of the file. The correct order of the entries in the file is kept only in Y\$. Provided that Y\$ knows where the 378th entry is, for instance, it is not important that it is actually stored in the 378th place.

Testing Module 5

It is difficult to test this module until the search and display function has been added to the program, allowing entries to be displayed with ease. You may care to input a few entries and then stop the program to test whether they have been inserted into B\$. Remember that they have been inserted in the order in which they were input. You can also examine Y\$ with this loop if you wish.

```
0000 FOR S = 1 TO LEN Y$ STEP 2: PRINT FN
A1: NEXT S
```

This will print out the pointer values, which you should be able to match up with the beginnings of the entries in the main file.

MODULE 6

The purpose of this module is to display entries from the file, either one at a time from the beginning or starting from the first entry which satisfies certain search conditions. Having displayed an entry the module gives the user the choice of continuing the search, examining the next entry, changing the entry or deleting it from the file. Note the continuous use of FN A and FN AS to provide the address of an entry and to extract it from the file.

Commentary

Line 2200. S is the number of the entry currently being examined. It is initially set to 2 because the first entry in the file is actually a dummy.

Lines 2290-2380. If the user inputs a search instruction beginning with III, the

program scans the first item of each entry until it finds one which begins with the character following III. If no such item is found the program returns to the main menu.

Lines 2390-2420. The special search which searches for any combination of characters specified, regardless of whether it is a whole item or not, is carried out by a separate subroutine which is called up by these lines if the search instruction begins with SSS.

Lines 2430-2500. Whole items in the file are examined to see whether they correspond to the item the program has been requested to search for. This is much faster than the special search, which moves along the file character by character. A fast binary search cannot be used since only the first items of each entry are in alphabetical order. For this search to be successful the item input must be exactly the same as the item in the memory. Searching for Smith, J in the file would not find Smith, John, whereas using special search, SSSSmith, J would find Smith, J or Smith, John but would be much slower.

Lines 2510-2570. This section prints out an entry using the subroutine at 2850 which we have already examined.

Lines 2580-2740. Having discovered an entry which satisfies the search criteria, the module now offers the user the choice of paging through the file entry by entry, searching for the next entry which satisfies the original search criteria or calling up the routine which allows the entry to be altered or deleted.

Testing Module 6

You can test the correct functioning of all the search functions with the exception of the special search. The amend function has not yet been entered.

```
2170 REM *****
2180 REM SEARCH
2190 REM *****
2200 LET S=2
2210 PRINT "PAGER 2:"
2220 SEARCH
2230 PRINT "COMMANDS AVAILABLE
2240 PRINT "INPUT ITEM FOR NORM
2250 PRINT "PRECED WITH "SSS"
2260 PRINT "FOR "SPECIAL SEARCH"
2270 PRINT "PRECED WITH "III"
2280 PRINT "TO SEARCH FOR
2290 PRINT "FIRST CHARACTER OF ENTRY"
2300 PRINT "ENTER FOR FIRST ITEM
2310 PRINT "ON FILE"
2320 PRINT "*****
2330 PRINT "INPUT SEARCH ITEM:
2340 GO SUB 2780
2350 PRINT "09(8 TO )
2360 LET S=2
2370 IF LEN S=1 THEN GO TO 2510
2380 LET C=FN A1
2390 IF LEN S=2 THEN GO TO 2430
2400 IF S(2) TO 4)=""III" THEN C
2410 GO TO 2500
2420 FOR I=5 TO N
2430 LET S=I
2440 LET C=FN A1
2450 IF C=C(1)+S(1) THEN GO TO
2460
2470 NEXT I
2480 GO SUB 2780
2490 IF S(2) TO 4)=""SSS" THEN G
2500 GO TO 2430
2510 GO SUB 2980
2520 IF C=S(1) THEN GO TO 2510
2530 RETURN
2540 FOR X=1 TO X
2550 IF FN A(1)=CHR$(2+CHR$(255
2560 THEN RETURN
2570 LET C=C+CODE$(C)
2580 NEXT X
2590 LET S=S+1
```

```
2498 LET C=FN A1
2499 GO TO 2430
2500 LET C=FN A1
2501 IF C(1)=CHR$(2+CHR$(255
2502 THEN RETURN
2503 LET C=C+CODE$(C)
2504 NEXT X
2505 LET S=S+1
2506 PRINT "PAGER 2:"
2507 SEARCH
2508 PRINT "COMMANDS AVAILABLE:
2509 PRINT "INPUT ITEM FOR NORMAL SEARCH
2510 PRECEDE WITH "SSS" FOR
2511 SPECIAL SEARCH
2512 PRECEDE WITH "III" TO SEARCH
2513 FOR FIRST CHARACTER OF ENTRY
2514 ENTER FOR FIRST ITEM ON FILE
2515 *****
2516 INPUT SEARCH ITEM:
```




Twinkle, Twinkle

Keith and Steven Brain
present a Singalong
Dragon program.

As sales of the Dragon 32 soar at Christmas, thousands of bemused mothers will once again be asking the eternal question "It's very nice dear, but what does it do?"

As it is Information Technology year, we have applied ourselves to this communication problem and devised a couple of programs which illustrate the string handling, sound and high-resolution graphic facilities and show how to train your Dragon to help with the Christmas chores.

Too much singing of carols can be bad for your voice, so what about a program which not only plays the tunes but also displays the words in time to the music? Program 1 (*Singalong*) uses some sneaky string slicing techniques to ease this task.

The words, or rather the individual syllables which are sung on separate notes, are contained within *Data* statements on lines 10 and 20 (not more than 255 characters can be put on a single program line). Spaces between words are included in the data, and the end of a line is indicated by (/).

The tune is contained with *As* in line 30. The format is the usual Dragon *Play* format, except that all natural (ie not sharp or flat) notes are preceded by a space. It is necessary to convert all *Play* instructions into two characters in this way, as the *Play* commands (like *O2*, *M* and *T5*) are two characters and the slicing technique must treat information in the same way. Sharps and flats are entered without a leading space as usual (eg *B-*, *F+*).

Xs in line 40 contains all of the characters which indicate that a note (rather than a change in octave, note length etc) is to be *Played*.

Line 50 steps through *As* two characters at a time by means of *For N = 1 To Len(As)* Step 2 and puts these two characters into *Bs* by means of *Bs=Mid\$(As,N,2)*. *Bs=Left\$(Bs,1)* selects the first character of *Bs* and tests by *X=Instr(1,Xs,Bs)* if this is an actual note rather than another *Play* command. It is not necessary to define all the possible sharp, natural and flat notes, as naturals are characterised by a leading space and sharps and flats by a letter from *A-G*.

If *Bs* is not a note, then line 80 *Plays* the command, without printing anything and then returns to take the next two characters. If *Bs* is a note, then line 70 *Reads* the appropriate syllable from the *Data* and checks by *If Right\$(Cs,1)* whether it is a (/). If it is not, then *Bs* is printed with a trailing semicolon.

If the last character of *Bs* is a (/) then all of *Bs* except the last character (/) is printed

by *C=Len(Cs)-1:Print Left\$(Cs,C)*, followed by a semicolon, and then the print position is moved to the next line by an extra print which is not followed by a semicolon.

So, now we have trained the Dragon to sing carols for us, what about some Christmas decorations? Program 2 (*Xmas 82*) can provide the answer with an interesting demonstration of high-resolution graphics which should certainly impress your relations.

Rather than spoil the surprise, we will leave you to enter the program to find out exactly what is in store, but the following notes explain some of the more devious points in the program.

Line 20 partially superimposes a series of similar objects. Line 40 draws a line in an unused colour to link together these items which are to be *Painted* the same colour.

Line 60 selects random points in an area of the screen around the picture and checks by *Ppoint* if these are set to colour 1. If they are, then it draws a randomised *Circle* at that point in random colour, and makes a sound which depends on the co-ordinates. In line 70 there are two sequential *Paint* commands, as the required colour cannot be painted directly.

A drawback of the Rom is that the *Draw* command does not allow you to enter variables in a blank move (*BM*) statement ie *Bmx,Y* for example. This can be circumvented by first plotting a line of zero length at the variable co-ordinates required (line 100 *Line(X,Y)-(X,Y),Pset*). This sets the next *Draw* position to those co-ordinates.

If you have nothing to do on Boxing Day, you might like to try linking programs 1 and 2, especially if you are dreaming of a white Christmas.

```
1REM XMAS 82 COPYRIGHT K&S BRAIN
151182
```

```
10 PHODE 3.1:PQLS4:SCREEN1,0
```

```
20 DRAW*BM50,1":FORM=1TO20STEP2:
DRAW"S"=STR$(N):DRAW"C10B16H8D5
":NEXTN
```

```
30 DRAW*BM50,130C1L2D10R4U10L2C3
D5"
```

```
40 DRAW*BM50,2C3D25":PAINT(50,14
5),1,7
```

```
50 DRAW*BM50,160C2L4D4F2R4B2U4L4
":PAINT(50,176),2,2
```

```
60 FORM=1TO500:A=RND(80):B=RND(1
40):C=RND(3)+1:IF PPOINT(A,B)=1
THEN CIRCLE(A,B),RND(4),C,RND(10)
+0.4: SOUND A,1
```

```
70 NEXTN: DRAW*BM140,140C2S4F5R6O
E5L70":PAINT(145,142),2,2:PAINT(
145,142),3,4
```

```
80 DRAW*BM150,145":CIRCLE(175,12
5),3,2,1,43,09:DRAW*BM139,141C
2R70":PAINT(175,125),2,2
```

```
90 DRAW*BM172,90C1S8Q2L4D2L2D2L2
D4R4U2R2U2R2U2A2A":PAINT(165,95),
1,1:DRAW*BM172,90F2B4D2R2D2R2D4L
4U2L2U2L2U4H4":PAINT(178,95),1,1
:CIRCLE(170,95),4,4:CIRCLE(174,9
7),4,4:PAINT(170,95),4,4:PAINT(1
74,97),4,4
```

```
100 FORM=1TO10000:X=RND(256):Y=B
ND(192):LINE(X,Y)-(X,Y),PSET:DRA
W"S"=STR$(INT(N/30)):DRAW*NUMDNL
NRNMFGRH":NEXT N
```

```
1REM SINGALONG COPYRIGHT K&S BRA
IN 151182
```

```
DATAO,COME,ALL,YE,FAITH,
FULL,JOY,FULL,AND,TRI,UN,PHAN
T,O,COME,YE,O,COME,YE,TO
,BE,TH,L8,HEN,COME,AND,BE,HOL
D,HIM/,BOHN,THE,KIND,OF,A,N
,GELS/,O,COME,LET,US,AD,ORE
,HIM/
```

```
20 DATACOME,LET,US,AD,ORE,HI
M/,O,COME,LET,US,AD,ORE,H,I
M,CHRI,ST,THE,LORD
```

```
30 A$="02T5 FL2 FL4 C FL2 M CL
4 A G AB-L2 AL4 G FL2 FL4 E D E
F G AL2 EL4 DL8 CL2 CP4L203 C02L
4 M AL2 B AL4 O A E OL4 EL8 DL4
C F P E F GL2 FL4 E A M AB-L2 AL
4 G M A G FL2 EL4 PH-L2 AL4 GL
B FL2 F"
```

```
40 CLS:X$=" ABCDEFG"
```

```
50 FOR N=1 TO LEN(A$) STEP 2:B$
=MD$(A$,N,2):B$=LEFT$(B$,1):X$
=INSTR(1,X$,B$):IF X$>0 THEN 70
```

```
PLAY B$:NEXT N:RUN
```

```
70 READ C$:IF RIGHT$(C$,1)<>"/"
THEN PRINT C$:GOTO60
```

```
80 C=LEN(C$)-1:PRINT LEFT$(C$,C)
:GOTO60
```



Crashed out op art

Last week we looked at *Push and Pop* and how they can be used to access the machine stack, thus avoiding the use of a subroutine call. We also saw how the bytes are transferred from register to memory — the junior byte being loaded first.

Conversely:

LD HL (4105)

would have exactly the reverse effect (NB, it codes as 2A 05 41, following the standard convention). Similarly:

LD HL 1000

(an attempt to load *HL* with the value 1000 hex) encodes as:

21 00 10

so that, even though 1000 is data, not an address, its bytes get transposed as usual.

When a Basic program crashes, little harm is done — you can always break out, one way or another, without losing the program. But machine code crashes are more spectacular, and infuriating. Spectacular, because they often signal their presence by drawing op-art patterns all over the screen, and infuriating because (on the ZX81) the only way to break out of them is to pull the power plug out and lose the contents of Ram. You want to see a crash, to check this? OK, try this little program:

```
1 REM X
2 POKE 16514, 118
3 RAND USR 16514
```

The screen blanks, and the machine no longer responds to the keyboard. This is because it uses a Rom routine to scan the keyboard, but the Basic operating system is not in use during a *Usr* call of a machine code program. Once a crash occurs, you are stuck with it. Pull the plug and start again (however, there's no way to alter the Rom contents, so don't worry about doing any lasting harm. It is you, not the ZX81, that will suffer). But there are some simple precautions worth taking.

1. Check all machine code listings scrupulously and make sure you have input them correctly.
2. Never use *Halt* (hex code 76).
3. Make sure that *Calls* and *Ret*s match, as do *Pushes* and *Pops*.
4. Make sure you call the correct starting address.
5. Unless there's not much to lose, *Save* what you can on tape before calling *Usr*.

Do you remember we said that there is no Z80 multiply instruction? Let's write a subroutine to do the job.

First, examine the nature of the problem. There is no better way of doing that than looking at an example. To keep things as simple as possible, we will work in 8-bit registers. So, if we want to multiply 9 by 13 it will look like:

```
00001001
x 00001101
```

Now we can treat this as conventional long multiplication, but because it is in binary, it's actually easier than usual. If the current digit we're multiplying by is 1, copy the top line — if it's zero, do nothing:

```
00001001 P
x 00001101 Q
00001001
00100100
01001000
01101010
```

Of course we have had to add in zeros on the right at each stage, just as we would in a decimal long multiplication. In machine code terms, that is equivalent to a shift left. We have called the two numbers *P* and *Q*, for reference.

While *P* is shifted left, it's also going to be convenient to shift *Q* right, because that way we only need to keep examining the junior bit of *Q* to determine whether to add *P* into the sum or not.

Assume that *P* and *Q* are in the *D* and *E* registers. The procedure is:

1. Set the A-register to zero.
2. If the junior bit of *E* is 1 then add *D* into *A*.
3. Shift *D* left.
4. Shift *E* right.

repeat these steps 8 times

Here's a first stab at the code:

```
LD A,00
LD B,06
```

The first step is obvious. The second sets *B* to act as a loop counter in conjunction with a *Djnz* to come at the end. Now we want to test the junior bit of *E*. The only way we currently have of doing that is to use a mask pattern (00000001) with an *And* operation, so let's set up the *C* register to that pattern:

LD C,01 [see table for hex coding]

We can only *And* with the *A*-register, which will destroy its current contents, so we'll save it in *L* first:

LOOP: LD L, A

then extract the junior bit of *E*, and restore the *A*-register:

LD A, C

AND A, E

LD A, L

If the result of the *And* was zero, we need to jump round the "add *D* into *A*" part of step 2 so:

JRZ SHIFT

Note that since *Ld* does not affect the flags, the *JrZ* still refers to the *And*. Otherwise perform the *Add*:

ADD A, B

Now do the shifts:

SHIFT: SLA D

SRA E

and see if we've done the loop enough times yet:

DJNZ LOOP

RET

Below is the whole thing.

If you want to try this program out, you will have to arrange for the *D* and *E* registers to hold the values to be multiplied. So you could precede the program by something like:

```
LD HL, 4300 21 00 43
LDD, (HL) 56
INC HL 55
LD E, (HL) 5E
```

and then *Poke* 4300 (hex) and 4301 (hex) with the values to be multiplied, before calling the program. These two bytes will, of course, be the two zero bytes at the beginning of the routine, so the *Ld*, *Hi*, 4300 will start in 4302.

Address	Instruction	Hex code
0000	LD A, 00	3E 00
0002	LD B, 06	06 08
0004	LD C, 01	0E 01
0006	LOOP:	LD L, A 6F
0007		LD A, C 79
0008		AND A, E A3
0009		LD A, L 7D
000A	JRZ SHIFT	28 01
000C	ADD A, D	82
000D	SHIFT:	SLA D CB 22
000F		SRA E CB 2B
0011		DJNZ LOOP 10 F3
0013	RET	C9

If you have any machine code sub-routines/tips/games, please send them to: Machine Code, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem **Peek** it to Ian Beardsmore and every week he will **Poke** back as many answers as he can. The address is **Peek & Poke**, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

NO KNOWN LIST OF POKES AROUND

J Jarret of 4 Honeycroft, Welwyn Garden City, Herts. writes:

Q I wonder if you could help me with a couple of queries. Firstly, can the **Cap Lock** on the Spectrum be set from software, and if so, how? Is there a complete list of useful **Pokes** anywhere which would help me in programming? Also, if you publish this letter, I am very interested in graphics and so would like to contact anyone in my area who has a micro with user defined graphics.

A **Caps Lock** can be set by **Poke 23658,8**. This will give an inverted capital **C** cursor. When you have finished, use **Poke 23658,0** to reset your computer to normal.

As far as I know, there is no actual list of useful **Pokes** on the Spectrum available, though I am sure that one would, as you say, be very useful. Certainly we at **Popular Computing Weekly** are very interested to hear such things.

GET IN TOUCH WITH ATARI GROUPS

Steve Bates of Leopard Rise, Worcester, writes:

Q I recently bought an Atari 400 micro-computer. I know very little about its language. Please could you tell me where I can find information on the Atari 400, and on software for it.

A There is quite a lot of support for the Atari computers, and it seems to be growing. There are two user groups. One can be contacted by writing to 'Atari Computer Owners Club' care of Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex. Another user club is based around the Silica shops and can be contacted at Silica Atari 400/800 users club, 1 The Mews, Hatherly Road, Sidcup, Kent DA14 4DX.

Both clubs have newsletters or magazines. They would probably be the best way for you to make contact with other Atari owners in your area.

One of the advantages of the Atari set up is the large amount of software available on cartridge, cassette and disk. Either of the shops mentioned could supply you with a wide range to choose from.

The only Atari book I have had a chance to look at is *De Re Atari*, which is recommended by Atari and appears to be very good. It is available from both shops and costs around £17.

Atari computers and software are now being carried by the Spectrum group of shops and there is one actually in Worcester — David Waring Ltd, 1 Marmion House, High Street, Worcester. This might be the best place for you to start looking.

SD Lang of Bothlin Drive, Stepps, Glasgow, writes:

Q Recently, after replacing a roll of paper, my ZX printer has taken to printing in double height characters. Can you explain what has happened? Is there a way to select the size of the character you want printed (either in a program or by a switch on the printer)? Or is there something wrong with my printer? I have enclosed an example of the print out before and after.

A As you say the characters are double height, not double width. If you look closely, you will see that the extra height does in fact come from the blank line that is between every printed line.

Inside your printer there are two heads that actually spark on to the paper. These are mounted on what can only be described as a sort of caterpillar track. So, in every half turn of the track, one or other of the heads will scan along the line of the paper. Clearly what

ENCOUNTERED PROBLEMS

Alex Ames of High Lorton, Cockermouth, Cumbria, writes:

Q It has been stated that it is possible to write a program for the ZX81 directly onto the Spectrum. How? I cannot seem to be able to do it. Can you help?

A You are not the only person to ask this, but it is quite possible to do. ZX81 Basic is a sub-set of Spectrum Basic in almost all respects. You do not say where you have encountered problems. The only areas to look at are **Peek** and **Poke** because there are some differences in the two memory maps. There is no scroll on the ZX Spectrum, and no **Unplot**. The command **Print At** on the ZX81 only needs the single command **At** on the Spectrum.

If it is not one of these, then the only thing that I can think of is that you do not have enough room. That would only be true if you have a 16K Ram pack on your ZX81, and an unexpanded Spectrum. If this was the case then you might be trying to get, say, a 12K program from your ZX81

on to your Spectrum. Unfortunately, the Spectrum only has 9K of user Ram, the rest being taken up by the variables, screen map and so on.

ONBOARD 6502 WITH THE TUBE

Anne Cheney of Canvey Island, writes:

Q When looking at details on various computers, and trying to decide which to buy, I have seen the word 'Tube' twice used about the BBC micro. It seems important, but I have not seen it on another computer. Could you tell me what it does?

A The Tube is essentially a way of using a second processor at the same time as using the onboard 6502. If a second processor was connected up then the onboard 6502 would handle the mechanics of the system, such as the keyboard control of peripherals, and the video output, while the second processor would deal with the actual program.

The second processor does not have to be another 6502. At the moment a ZX80 board is being developed by Acorn, which among other things would enable CP/M to be used on the BBC micro.

TRANSFORMING CHARACTERS ON THE ZX PRINTER

has happened is that one of these heads has fallen off, so instead of getting two print lines every turn, you are now getting only one. Unfortunately, the paper is moved relative to the head every half a turn. This is how you get the alternate printing.

Because the head must be almost entirely disconnected from the belt it will have to be put back. Inside, the printer is very compact and I would not

suggest that you have a go at this yourself, unless you have a lot of confidence in your ability to take such things apart.

You have the choice of either sending it back for repair or else keeping it as it is. Although the print is much tighter, I know some people who find the larger size of the characters more than compensates for this. However, it does have the disadvantage of using twice the amount of paper.

Before:

```
10 LET tim=0
20 LET score=0
100 REM @ Bomb Alley @
110 REM Prog. 28/10/82
1000 REM
```

After:

```
10 LET tim=0
20 LET score=0
100 REM @ Bomb Alley @
110 REM Prog. 28/10/82
1000 REM
```

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511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 533, 535, 537, 539, 541, 543, 545, 547, 549, 551, 553, 555, 557, 559, 561, 563, 565, 567, 569, 571, 573, 575, 577, 579, 581, 583, 585, 587, 589, 591, 593, 595, 597, 599, 601, 603, 605, 607, 609, 611, 613, 615, 617, 619, 621, 623, 625, 627, 629, 631, 633, 635, 637, 639, 641, 643, 645, 647, 649, 651, 653, 655, 657, 659, 661, 663, 665, 667, 669, 671, 673, 675, 677, 679, 681, 683, 685, 687, 689, 691, 693, 695, 697, 699, 701, 703, 705, 707, 709, 711, 713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 749, 751, 753, 755, 757, 759, 761, 763, 765, 767, 769, 771, 773, 775, 777, 779, 781, 783, 785, 787, 789, 791, 793, 795, 797, 799, 801, 803, 805, 807, 809, 811, 813, 815, 817, 819, 821, 823, 825, 827, 829, 831, 833, 835, 837, 839, 841, 843, 845, 847, 849, 851, 853, 855, 857, 859, 861, 863, 865, 867, 869, 871, 873, 875, 877, 879, 881, 883, 885, 887, 889, 891, 893, 895, 897, 899, 901, 903, 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925, 927, 929, 931, 933, 935, 937, 939, 941, 943, 945, 947, 949, 951, 953, 955, 957, 959, 961, 963, 965, 967, 969, 971, 973, 975, 977, 979, 981, 983, 985, 987, 989, 991, 993, 995, 997, 999, 1001, 1003, 1005, 1007, 1009, 1011, 1013, 1015, 1017, 1019, 1021, 1023, 1025, 1027, 1029, 1031, 1033, 1035, 1037, 1039, 1041, 1043, 1045, 1047, 1049, 1051, 1053, 1055, 1057, 1059, 1061, 1063, 1065, 1067, 1069, 1071, 1073, 1075, 1077, 1079, 1081, 1083, 1085, 1087, 1089, 1091, 1093, 1095, 1097, 1099, 1101, 1103, 1105, 1107, 1109, 1111, 1113, 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1131, 1133, 1135, 1137, 1139, 1141, 1143, 1145, 1147, 1149, 1151, 1153, 1155, 1157, 1159, 1161, 1163, 1165, 1167, 1169, 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 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ZX81 16K RAM pack, work station, plus software including chess, bank account and many games, £75.00 ono. Tel: 01-600 2300 ext 3476, Mr Lampi, 9 am-8.30 pm.

Commodores for sale

VIC20 plus cassette with manual, one year old, dust covers, plus software book and VIC computing magazines. £160.00. Tel: 0444 413591.

VIC20 8K, plus Datacassette, joystick, VIC revealed, dust cover, some games, still under guarantee, £165 ono. Tel: 0784 34133 (after 6 pm).

CBM PET 3032, booklet + superchip, cassette deck, 3022 printer, paper, leads, programs, £575 ono. Bryer: 01-891 0855 (evenings).

VIC20 - 8K RAM, cassette deck, super-expander, 30 software programs, £180 ono. Stephen, Tel: 01-980 8675 (after 5 pm).

VIC20, still guaranteed, plus cassette unit, programmers aid, super expander, voodoo castle, light pen, reference manual, software including Frogger, Blitz, Amok, Index, £375. Tel: Robert 01-455 1132 (after 6 pm).

VIC20 Data set, books, 16K super expander, cartridge cassette, worth £550.00, sell for £300.00. Tel: Wrexham (0978) 822505.

VIC20 COMPUTER plus £35.00 of software and cassette unit, £125.00. Tel: 051-228 1359.

VIC FORTH CARTRIDGE, + starting FORTH manual, £40. Tel: Preston 864599.

VIC20 + 16K, Data set, recorder, much software, introduction to basic, VIC revealed. Worth £400.00, bargain £275.00. Tel: 0708 47993.

VIC20, + cassette deck + joystick + programmers reference guide + Blitz + Vic arcade game book + over 40 games, £170. Great Dunmow (0371) 810720 (after 5 pm weekdays).

COMMODORE VIC20 + cassette also a Stack 16K + 3K expansion. Prog aid cartridge, Commodore 3K Ram, Vic Revealed. Complete set of Vic computing, £230. Tel: Sunbury upon Thames 85763.

VIC20 with cassette unit and Space Battle cartridge, £25 of bought software, £175.00. Tel: Henley 5588.

VIC20, extra 3K ROM super expander cartridge, including Jolly Monster cassette unit, joystick, introduction to basic manual plus cassette, plus other software tapes. £200.00. Tel: 01-380 1131.

VIC20, Cassette deck, stack store board with 8K, Vic kit 2 with high-res, introduction to Basic 1 and 2, innovating computing book, under guarantee, £280.00. Tel: 01-328 6048 (after 6 pm).

VIC20, Cassette deck, Arlon expansion unit plus 8K Ram/Pac and cartridge games Alien and Super Lander, joystick plus programs, reference guide and tapes, £275.00. Tel: Rotherham (0709) 544781 (9-6 pm).

Ataris for sale

ATARI VCS + 5 cartridges including Space Invaders, as new in original box, £110 ono. Tel: 081-678 9910, evenings or weekends.

ATARI VCS, in mint condition, including paddles, joysticks + two cartridges, combat and missile command. Wanted: £70. Tel: Leyland 21744.

ATARI VCS with Invaders and Breakout, two joysticks and paddles, as new, £90.00 ono. Tel: 061-998 3320.

ATARI VCS, Hardly used, + 6 cartridges inc, Asteroids and Invaders, all in good condition, £130 ono. Tel: 021-523 8666 (after 4 pm).

ATARI VCS, with cartridge holder, 9 cartridges: Pac-Man, Defender, Asteroids, etc. Worth £350 new, asking £270 ono. Tel: Mike on 01-670 3485 after 6 pm.

ATARI VCS with 5 cartridges, Combat, Space Invaders, Asteroids, Breakout and Basketball, cost over £200, accept £100 ono. Tel: Ipswich 70487.

ATARI 400, 16K basic, Star Raiders, Asteroids and Basket Ball Roms, amusing graphics, 2 months old, full guarantee, £280.00. Tel: 051-427 4927 (Dave).

ATARI VCS with 11 cartridges including Asteroids, Missile Commands Indi 500, £200 or very near offer. Tel: Waltham Cross 21260 after 6 pm.

Tandys for sale

TRS 80, Model 1, level 2, 48K with disk drive and printer, vgc, £1,000 ono, 197 Oak Road, West Bromwich, West Midlands. Tel: 021-553 3005.

VIDEO GEME EG 3003, 16K RAM, 12K ROM with lower case, built-in sound unit, plus driver program, also books, plus over £200 of software, £275 ono. Tel: Leicester 0533-704193 (after 12 am) A. Marshall.

VIDEO GENIE 16K, plus manuals, demo tape and ctronics interface card, £180. Tel: 01-647 9649 (9 am-5 pm).

VIDEO GENIE 1, 16K RAM, sound, re-number, machine code monitor, lower case, software, includes Asteroids, £200 ono. Tel: Workshop 771222.

VIDEO GENIE EG003, 16K memory, built-in cassettes, games and adventure cassettes plus books on graphic games and service manual, £200.00. Tel: Stevenage 720521.

GENIE 1, 16K Ram, 13K Rom, vu meter, extra keys, internal cassette, two books, 32 software tapes, £230 ono, P. Stallard. 01-689 0022 (6 pm).

TRS80 MODEL 1, 16K with model seven printer with over £500 worth of software, £700. Also Atari VCS plus Combat and Basic programming plus keyboards, £70. Colin Maxted, 52 Bowyer House, Vermont Road, Wandsworth, London SW18.

TRS 80, 16K, level II, T Bug, Editasm, £190.00. Light pen, loudspeaker, £15.00. Complete years "80-Microcomputing", "Microsoft Basic D'Codet", and other books, software, £50.00 ono. Tel: 01-337 4403, ext 42, ext 42, 8-4 pm.

Acorns for sale

ACORN ATOM 12+12K, Floating point Rom, toolbox, power supply +cassette player + 20 cassettes of S/W, S. Atom. Books. The lot £180 ono. Tel: 01 992 9249 after 4 pm.

BBC MICRO MODEL B + lots of software including Machine Code Scroll, Invaders and Pacman, still in box and can be mailed to you. £390. Tel: Newcastle (0632) 737654.

BBC COMPUTER MODEL B, as new, £375. Tel: Toines (Devon) 863454.

ACORN ATOM 12+12K, fitted with all accessories including floating point ROM, VIA, tool box, 20 cassettes + cassette player and 5 books, the lot £200. Tel: 01-992 8249 (after 4 pm).

ACORN ATOM 12K Rom + 12K Ram including link floating point, £180.00 ono. Tel: 01-501 1629 (evenings).

ACORN ATOM, 5k Ram, PSU, little used, £100.00. Tel: 061-339 4991.

ACORN ATOM, 12K+12K, + utilikit, PSU, leads etc, manual + books, games, cassettes, less than 6 months old, £180. Tel: 01-245 3470 (daytime), Mr Armstrong.

ATOM 12K + 12K, Five bolt PSU books, manuals etc. £150.00. Tel: Padgate 817281.

For sale

NINE ROLLS of ZX paper, £10.00. Tel: Sheffield 363273.

DRAGON 32, 32K, original packing, £150 ono. Sanderson: 01-834 8259 (evenings) 01-213 6310 (daytime). Pickup in Central London.

TV GAME, Interton 4000 plus 19 cartridges, £150.00 ono. Tel: Wickford (03744) 82892.

DRAGON 32, Almost brand new with one games cartridge and cassette lead, some software on cassette, still in original box, £170.00 ono. 01-330 2380.

MICRO-WRITER, as new, £450. Tel: 0306 79432. Ask for Ian.

FX602P CALCULATOR, £45 ono. Peter, Tel: 01 723 9947 after 6 pm, not Tuesdays.

UK101 8K, cased, mono 2, toolkit, joysticks, mini eprom board, prog assembler and more software, £190. Tel: Bradford (0274) 727635 after 6 pm.

TANGIERINE MICROTAN 65 + Tanex, keyboard, keypad, all manuals + software, £150 or swap for Spectrum. Tel: Milton Keynes (0908) 641722, Mr Green.

CASE FOR SINCLAIR SPECTRUM, £30.00. Tel: 01-223 9171, Mr Fisher. (As advertised in Computer Magazine).

FOR SALE, 13 Mattel Intellivision cartridges, £10 each. Tel: Bath 834595.

FOR SALE: Sinclair printer paper, two boxes, £8 per box. Tel: 01-899 0792, evenings (Richard Page).

Wanted

WANTED, 16K SPECTRUM with new board, in exchange for 16K Spectrum with old board. Apply to M. Purcell, Sherwood Hall, Nottingham University, Nottingham.

ZX81 16K, £50 or any other computer for under £100. Tel: Chesham, Bucks 772544 after 5 pm.

WANTED Super Expander 3K/8K/16K Ram expansions. Joystick for Vic20. Tel: Bill, 061-645 8371 evenings and weekend.

WANTED, VIC20 plus cassette deck, manuals and software. Tel: Tonbridge 352232.

WANTED: Any ZX81 or Spectrum genuine cassettes. Get some money back from your software investments. Send list and quotation to: C. Holm, Konvaljygen 8 S-53171 Lidköping, Sweden.

WANTED 8K OR 16K Ram pack for Vic20. Contact Frank McDowell, 0946 (Whitehaven) 3051 or 5112.

SPECTRUM 16K or 48K wanted. Tel: Alan on 061-973 9728 after 4.30 pm.

VDU FOR VIC20, will collect. Tel: Weston-Super-Mare 417199 evenings.

ZX81 16K WANTED. Newcoman Primary School, Redcar. Tel: 048318. Mr Flindall.

WANTED SINCLAIR ZX81 with 16K Ram Pack in excellent condition, Alan Lamont, 6 Herbert Road, Hornchurch, Essex. Tel: 45922 weekday evenings.

ZX81 16K, anything considered within 60 miles. Tel: Oxford 750296, Mr Page.

Zigurat



Babel's Tower

G. H. Hardy thought that a mathematician, like a painter or poet, was a maker of patterns — if the mathematician's patterns were more permanent than those of the painter or poet, then that was because the mathematical patterns were made with ideas. "The mathematician's patterns, like the painter's or the poet's, must be beautiful; the ideas, like the colours or the words, must fit together in a harmonious way. Beauty is the first test: there is no permanent place in the world for ugly mathematics." (*Mathematician's Apology*, revised edition, 1967).

I do not think that computing, or computer programming in particular, is a branch of mathematics, but I do believe that programming is essentially a human construction — an exemplification of a human's set of ideas. I also believe that there is no permanent place in the world for ugly programs, or ugly programming languages. But, as they say, beauty is in the eye of the beholder.

Start with Basic — a beautiful language (particularly in its original Dartmouth version). The quality of the ideas in that original version have scarce been bettered. Basic was a Beginner's All-purpose Symbolic Instruction Code, and how well it succeeded. Forget all these people who tell you that Basic is not the best language (for there is no best language in any case) but wonder if any of the languages that have been suggested as replacements are as novel now, as Basic was then.

Present Basics are not as beautiful, because the original integrity of the Dartmouth formula-

tion has been eroded, and for many purposes there are languages which are better than Basic — but will they ever be developed as far? And will anybody want to develop them? The beauty of Basic, and the quality of its ideas, are the reasons why it has been so successful.

Another beautiful language is Algol 68, and the beauty of Algol 68 (a language mainly reserved for large main-frames) is partly a result of its mathematical structure. Algol 68 has been the only language to make me feel excited when I read its description. It is not easy to explain, but what is so impressive about Algol 68 is the utter simplicity and power of the language (termed 'orthogonality') — even though to produce this simplicity requires a complex system of language analysis by the computer. Simplifying tremendously, the central building block of Algol 68 is called a clause, and every clause produces a result. As long as the result is of the correct mode it is possible to do anything to anything — within the rules.

To be beautiful does not always bring success. Though Algol 68 has its devotees it has not been as successful as that rather ugly language Cobol.

I find Cobol tedious and ugly because it lacks style, and has a strange verbosity I find alien. As a working language, however, Cobol has no competitors — most of the world's programs are written in Cobol, and it is estimated that more time is spent running Cobol programs than all other languages put together.

A language which seems to have taken on a new importance is Forth, and when I look at Forth I see a few flashes of beauty in an otherwise rather dull prospect. The beauty of Forth lies in its simplicity and inherent extensibility. Forth has been promoted as an easy language to use with advantages in speed and compactness, and indeed its simplicity in use interactively is beguiling.

But as an improvement on Basic it has too many inherent drawbacks — some of which have been removed with the new Jupiter Ace. One recent Forth version in a non-trivial benchmark was only twice as fast as Basic.

Boris Allen

Puzzle

The long and the short of it

Puzzle No 35

Concealed in the following jumble of letters is a message which might be thought applicable to this time of year. Although it's not 'leap' year why not try it out after the roast turkey and plum pudding? Now there's a clue if ever I heard one!

NPKNNEOAHG/TPA/R/SASRLO/SITC/PEED/GR/PREYAE/QUAEN/PR/UJMLVWFS/E TONNGWAYAEY

Can you decipher it? Once you have found the method to use, a short program might make your task easier.

Solution to Puzzle No 31

In addition to the set given — 182/384/576 — there are four other sets: 219/438/657, 267/534/801, 273/546/819 and 327/654/981 (if 078 is counted as a three-figure number then 078/156/234 may also be included).

The following program first generates the top number, checks for duplication, multiplies it by 2 and 3 and again checks for duplication:

```
10 FOR H = 1 TO 320 FOR T = 0 TO 9 IF H = T
  THEN GOTO 250 40 FOR U = 0 TO 9 IF U = T OR
  U = H THEN GOTO 250 60 LET N = H * 100 + T * 10
  + U * 70 LET A = N * 2 80 LET B = N * 3 90 LET AS =
  STR$ A 100 LET BS = STR$ B 110 IF LEN AS <> 3
  OR LEN BS <> 3 THEN GOTO 250 120 LET CS = AS
  + BS 130 FOR M = 1 TO 5 140 FOR L = M * 1 TO 6
  150 IF CS (M) = CS (L) THEN GOTO 250 160 NEXT L
  170 NEXT M 180 LET NS = STR$ N 190 FOR M = 1
  TO 3 200 FOR L = 1 TO 6 210 IF NS (M) = CS (L)
  THEN GOTO 250 220 NEXT L 230 NEXT M 240
  PRINT NS; " ", AS; " ", BS; 250 NEXT U 260
  NEXT T 270 NEXT H
```

Winner of Puzzle No 31

The winner is: Ralston Firth, Narcot Lane, Chalfont St Giles, Bucks, who provided a solution in Pascal on an Apple III. He receives £10.

Top 10

Atari

- (12) Jumbo Jet Pilot (Thom EMI)
- (21) Submarine Commander (Thom EMI)
- (34) Preppie (Adventure International)
- (43) Soccer (Thom EMI)
- (51) Pac-Man (Atari)
- (61) Star Raiders (Atari)
- (71) Air Strike (English Software)
- (81) Temple of Apshai (Epyx)
- (91) Shamus (Synapse)
- (101) Alien Swarm (Inhome Software)

*Cartridge

(Figures compiled by Callisto Computers, Birmingham 021-632 6458)

ZX Spectrum

- (11) Escape (New Generation)
- (21) Mazemon (Abbersoft)
- (32) Spectral Invaders (Bug-Byte)
- (41) Meteor Storm (Quicklive)
- (51) Night File (Newson)
- (61) Star Trek (Chromasoft)
- (71) Arcade Pack (C-Tech)
- (810) Gulpman (Campbell Systems)
- (91) Spectrum Chess (Artic)
- (101) Espionage Island (Artic)

*Requires 48K

(Figures compiled by Butler Micro Shop, London 01-759 2857)

Books

- (11) ZX Spectrum Explained, Hurdell
- (21) Easy Programming for the ZX Spectrum, Stewart and Jones
- (31) 280 Assembly Language Programming, Leventhal
- (41) Machine Code and Better Basic, Stewart and Jones
- (51) Programming the 8502, Zaks
- (61) The Working Spectrum, Lawrence
- (71) BBC Micro Revealed, Ruston
- (81) Vic Innovative Computing, Ramshaw
- (91) Starting Forth, Brode
- (101) Over the Spectrum, various authors

(Figures compiled by Watford Technical Books, Watford 0823 23324)

(Last week's position in brackets)

ZX81

- (12) Mazemon (Abbersoft)
- (21) 3D Defender (J.K. Greye)
- (31) Mazozo (Bug-Byte)
- (41) Frogger (D.J.L. Software)
- (51) 3D Monster Maze (J.K. Greye)
- (61) Adventure I (Abbersoft)
- (71) Gulp II (Campbell Systems)
- (81) Gauntlet (Colourmatic)
- (91) Flight Simulation (Psion)
- (101) Chess (Artic)

*All require 16K

(Figures compiled by Butler Micro Shop, London 01-759 2857)

Vic20

- (11) Adventureland (Commodore)
- (21) Omega Race (Commodore)
- (31) Rat Race (Commodore)
- (41) Grid Runner (Lamasoft)
- (51) Defenda (Lamasoft)
- (61) Night Crawler (Rabbit)
- (71) Blitz (Commodore)
- (810) Star Battle (Commodore)
- (91) Avengers (Commodore)
- (101) Voodoo Castle (Commodore)

*Cartridge, Requires 8K or 16K, 12K

(Figures compiled by the Vic Centre, London 01-992 9904)

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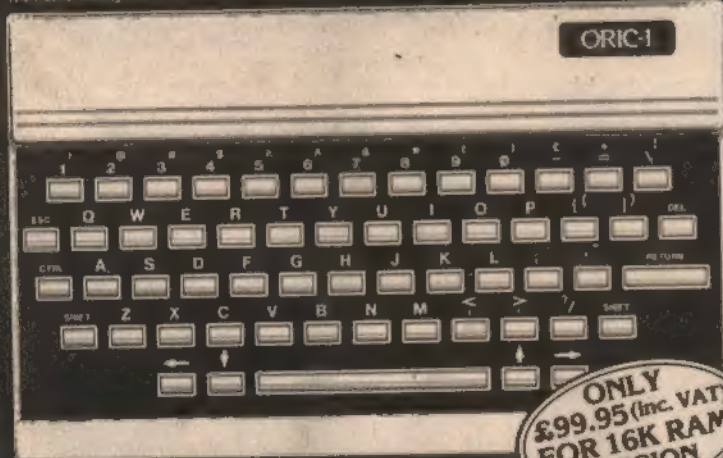
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